Vision Air Network and Server

Tutorial

8.105.8036EN / 2022-01-26

Metrohm

Metrohm AG
Ionenstrasse
CH-9100 Herisau
Switzerland
+41 71 353 85 85
info@metrohm.com
www.metrohm.com

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2.0

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Technical Communication
Metrohm AG
CH-9100 Herisau

This documentation has been prepared with great care. However, errors can never be entirely ruled out. Please send comments regarding possible errors to the address above.

Disclaimer

Deficiencies arising from circumstances that are not the responsibility of Metrohm, such as improper storage or improper use, etc., are expressly excluded from the warranty. Unauthorized modifications to the product (e.g. conversions or attachments) exclude any liability on the part of the manufacturer for resulting damage and its consequences. Instructions and notes in the Metrohm product documentation must be strictly followed. Otherwise, Metrohm's liability is excluded.

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1 Overview

1.1 What is Vision Air?

Vision Air is a modern, intuitive and easy-to-use software solution for routine Vis-NIR analysis and quality assurance. Vision Air is divided into 2 dedicated software parts.

While **Vision Air Routine** puts a focus on the needs of routine users, **Vision Air Manager** provides administrative functions to meet the requirements of laboratory managers and division managers.

Vision Air is available in 2 versions: **Vision Air Local** and **Vision Air Network**. Vision Air Local includes all the necessary routine applications as well as numerous management functions and enables the control of 1 Vis-NIR spectrometer.

In contrast to Vision Air Local, Vision Air Network enables users to control and configure any number of spectrometers. All data produced can be saved automatically, both locally and globally.

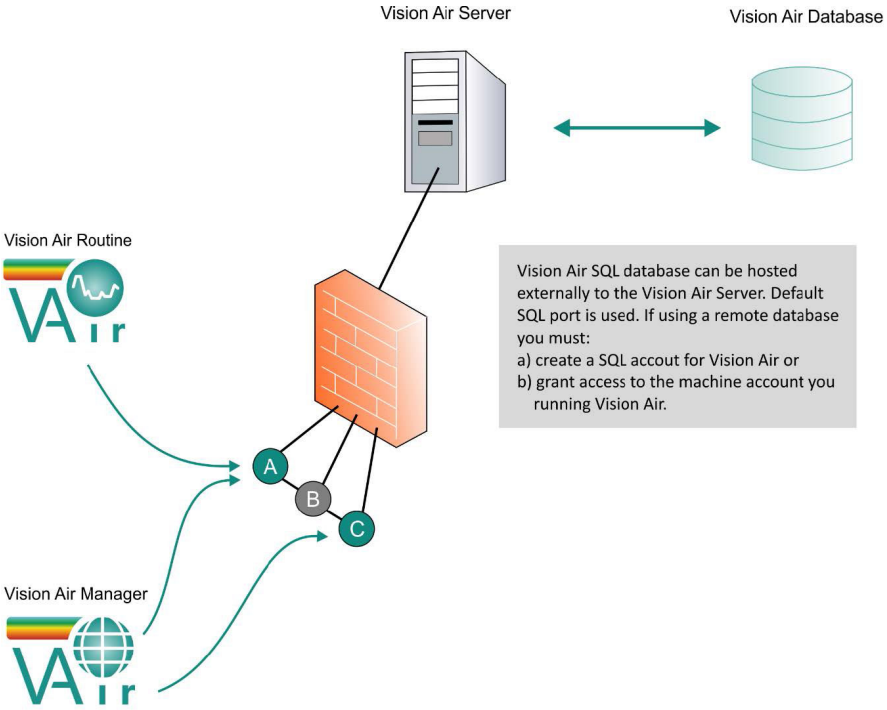
Vision Air Local

In Vison Air Local, the program parts Vision Air Routine and Vision Air Manager Local are both installed on 1 single computer.

This computer is directly connected to the instrument. The configuration of the instrument, which includes information such as new operating procedures and new parameters, is done by the local administrator in Vision Air Manager Local. All data, e.g. configurations, results and spectra is stored on the local PC.

Acquisitions are performed in Vision Air Routine.

Vision Air Network



In Vision Air Network, the program parts Vision Air Routine and Vision Air Manager Network are not installed on 1 single computer. Vision Air Routine is installed on the computer that is connected to the instrument. This can also be a multiple setup with several instruments and the corresponding computers. Vision Air Manager Network is installed on a computer that is connected to the network, e.g. on the computer of a laboratory manager.

For a network instrument, a network administrator configures the instrument with Vision Air Manager. In this setup, all data is stored on the local PC, but it is also transferred to the Vision Air server database during synchronization.

Acquisitions are performed in Vision Air Routine on the computer that is connected to the instrument.

Pharma versions of Vision Air Local and Vision Air Network

For working in regulated environments, both Vision Air versions can be purchased as pharma versions. Additional features, such as user management, audit trail and signing of objects are added to these versions.

1.2 Product versions

The product is available in the following versions:

Table 1 Product versions

Art. no.	Designation
6.6072.201	Vision Air 2.0
6.6072.202	Vision Air 2.0 Pharma
6.6072.203	Vision Air 2.0 Network Pharma
6.6072.204	Vision Air 2.0 Server
6.6072.205	Vision Air 2.0 Server Pharma
6.6072.206	Vision Air 2.0 Network
6.6072.207	Vision Air 2.0 Network Complete
6.6072.208	Vision Air 2.0 Complete
6.6072.209	Vision Air 2.0 Pharma Complete
6.6072.210	Vision Air 2.0 Pharma Network Complete

1.3 Symbols and conventions

The following formatting may appear in the documentation:

*(5-**12**)*	Cross-reference to figure legend The first number refers to the figure number. The second number refers to the product part in the figure.
1	Instruction step Numbers indicate the order of the instructions steps.
Method	Names of parameters, menu items, tabs and dialogs
File ▶ New	Menu path
[Continue]	Button or key

2 Safety

2.1 Intended use

Metrohm products are used for the analysis and handling of chemicals.

Usage therefore requires the user to have basic knowledge and experience in handling chemicals. Knowledge regarding the application of fire prevention measures prescribed for laboratories is also mandatory.

Adherence to this technical documentation and compliance with the maintenance specifications make up an important part of intended use.

Any utilization in excess of or deviating from the intended use is regarded as misuse.

Specifications regarding the operating values and limit values of individual products are contained in the "Technical specifications" section, if relevant.

Exceeding and/or not observing the mentioned limit values during operation puts people and components at risk. The manufacturer assumes no liability for damage due to non-observance of these limit values.

The EU declaration of conformity loses its validity as soon as modifications are carried out on the products and/or the components.

2.2 Responsibility of the operator

The operator must ensure that basic regulations on occupational safety and accident prevention in chemical laboratories are observed. The operator has the following responsibilities:

- Instruct personnel in the safe handling of the product.
- Train personnel in the use of the product according to the user documentation (e.g. install, operate, clean, eliminate faults).
- Train staff on basic occupational safety and accident prevention regulations.
- Provide personal protective equipment (e.g. protective glasses, gloves).
- Provide suitable tools and equipment to carry out the work safely.

The product may be used only when it is in perfect condition. The following measures are required to ensure the safe operation of the product:

- Check the condition of the product before use.
- Remedy defects and malfunctions immediately.
- Maintain and clean the product regularly.

2.3 Requirements for operating personnel

Only qualified personnel may operate the product. Qualified personnel are persons who meet the following requirements:

- Basic regulations on occupational safety and accident prevention for chemical laboratories are known and complied with.
- Knowledge of handling hazardous chemicals is present. Personnel have the ability to recognize and avoid potential dangers.
- Knowledge regarding the application of fire prevention measures for laboratories is available.
- Safety-relevant information is communicated and understood. The personnel can operate the product safely.
- The user documentation has been read and understood. The personnel operate the product according to the instructions in the user documentation.

2.4 Safety instructions

2.4.1 Danger from electrical potential

Contact with electrical potential can cause serious injuries or death. To avoid danger from electrical potential, observe the following:

- Operate the product only if it is in perfect condition. The housing must also be intact.
- Only use the product with the covers fitted. If covers are damaged or missing, disconnect the product from the energy supply and contact the regional Metrohm service representative.
- Protect live components (e.g. power supply unit, power cord, connection sockets) against moisture.
- Always have maintenance work and repairs on electrical components carried out by a regional Metrohm service representative.
- Disconnect the product from the energy supply immediately if at least one of the following cases occurs:
  - The housing is damaged or open.
  - Live parts are damaged.
  - Moisture penetrates.

2.4.2 Danger from biological and chemical hazardous substances

Contact with biological hazardous substances may cause poisoning from toxins or infections from microorganisms. Contact with aggressive chemical substances may cause poisoning or chemical burns. To avoid danger from biological or chemical hazardous substances, observe the following:

- Label the product according to regulations if it is used for substances that have a potential for chemical hazards and are generally subject to the Hazardous Substances Ordinance.
- Wear personal protective equipment (e.g. protective glasses, gloves).
- Use exhaust equipment when working with vaporizing hazardous substances.
- Dispose of hazardous substances in accordance with regulations.
- Clean and disinfect contaminated surfaces.
- Only use detergents that do not cause any unwanted side reactions with the materials to be cleaned.
- Dispose of chemically contaminated materials (e.g. cleaning material) in accordance with regulations.
- Proceed as follows in case of a return shipment to Metrohm AG or a regional Metrohm representative:
  - Decontaminate the product or product component.
  - Remove the labeling for hazardous substances.
  - Create a declaration of decontamination and enclose it with the product.

2.4.3 Danger from highly flammable substances

Using highly flammable substances or gases may cause fires or explosions. To avoid danger from highly flammable substances, observe the following:

- Avoid ignition sources.
- Use protective grounding.
- Use exhaust equipment.

2.4.4 Danger during transport of the product

Chemical or biological substances may be spilled during the transport of the product. Parts of the product may fall down or may be damaged. There is a risk of injury from chemical or biological substances and pieces of broken glass. To ensure safe transport, observe the following:

- Remove loose parts (e.g. sample racks, sample vessels, bottles) before transport.
- Remove liquids.
- Lift and transport the product with both hands on the base plate.
- Lift and transport heavy products only according to instructions.

2.5 Design of warning messages

There are 4 hazard levels for warning messages. The following signal words are used for classifying the hazard levels in warning messages:

- **DANGER** indicates a hazardous situation which, if not avoided, will result in serious injury or death.
- **WARNING** indicates a hazardous situation which, if not avoided, could result in serious injury or death.
- **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE** indicates a hazardous situation which, if not avoided, could result in property damage.

Warning messages differ in design (color and warning sign) depending on the hazard level:

DANGER

Type and source of danger

Consequences when not observing the notice: An irreversible injury that may result in death is very probable.

- Measures to avoid the danger

WARNING

Type or source of danger

Consequences when not observing the notice: A serious injury that may result in death is probable.

- Measures to avoid the danger

CAUTION

Type or source of danger

Consequences when not observing the notice: A minor to moderate injury is probable.

- Measures to avoid the danger

2.6 Meaning of warning signs

This documentation uses the following warning signs:

Table 2 Warning sign according to ISO 7010

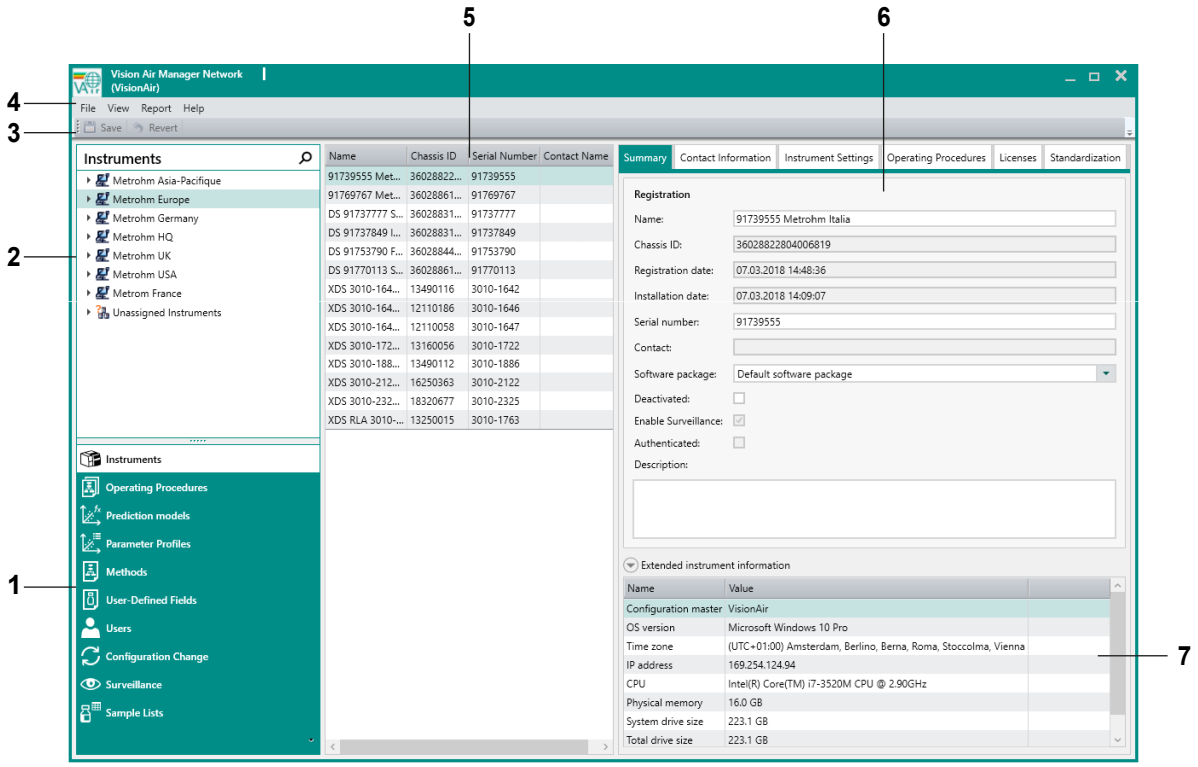
Warning sign	Meaning
	General warning sign
	Warning of electrical voltage
	Warning of hand injuries
	Warning of sharp object
	Warning of hot surface
	Warning of biological hazard
	Warning of toxic materials
	Warning of flammable materials
	Warning of corrosive substances
	Warning of optical radiation
	Warning of laser beams

Depending on the intended use of the product, the corresponding warning sign stickers must be placed on the product.

3 Vision Air – Functional description

3.1 Vision Air Manager Network

3.1.1 User interface



1 Navigation window
Options that enable the user to navigate through Vision Air Manager *(see "User interface", chapter 3.1.1, page 9)*.

2 Structure window
Depending on the selection in the navigation window, the structure window shows a tree of all created and registered networks (with all instruments) or users.

3 Toolbar

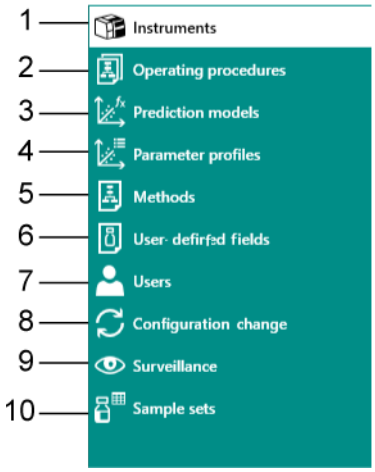
4 Menu bar

5 Data window
The information in this window varies depending on the selection in the navigation window, e.g. for the navigation window **Prediction models** all available prediction models are displayed.

6 Work window
The information in the work window varies depending on the selection in the navigation window and the structure window. The text fields in the work window are either editable (white) or read-only (grey).

7 Functional area
The work window can be divided into several functional areas.

Navigation window



1 Instruments
Registering instruments and editing instrument properties.

2 Operating procedures
Operating procedures are key elements in Vision Air to conduct measurements. An operating procedure consists of 1 or several prediction models, a method as well as optional user-defined fields. Operating procedures are selectable in Vision Air Routine to conduct analysis.

3 Prediction models
Prediction models are algorithms that correlate NIR spectra to sample properties, e.g. water concentration.

4 Parameter profiles
Parameter profiles define the parameter to be analyzed in accordance with the linked prediction model, e.g. a parameter profile for a prediction model to quantify water content is water in %.

5 Methods
Methods describe the way how measurements are conducted, e.g. information on the sample vessel type used, number of repetitions or sample temperature during an analysis.

6 User-defined fields
User-defined fields allow users to create customized sample registration fields. During routine analysis, a user may need to enter additional information, e.g. the batch number.

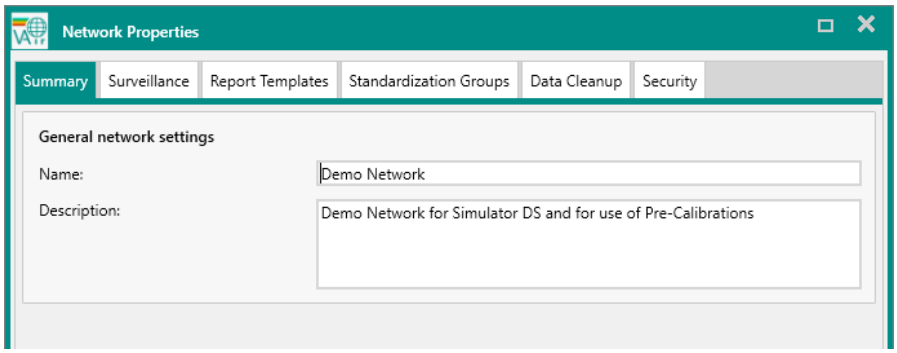
7	**Users** In the **Users** section the user permissions for the Vision Air Manager Nework are defined.
8	**Configuration change** The **Configuration Change** section lists all existing configuration changes. A change in the configuration needs to be uploaded to the individual clients. The individual clients are also managed in this section.
9	**Surveillance** Overview of all measurements, events and instrument tests.
10	**Sample lists** Sample lists are used to organize collected spectra and results. Sample lists are also used to conduct slope corrections and bias corrections.

3.1.2 Network group settings

The structure window displays the available networks, the instrument types and the instrument groups for all sections except the **Users** section.

To define network properties, right-click on a network and select **Properties**.

The network properties contain the following work tabs:



Summary

The network name and a description of the network can be entered in the **Summary** tab.

Surveillance

The calculation intervals (Maximum/Minimum) can be changed in the **Surveillance** tab. Calculation intervals handle the frequency of updating automatic flags in **Surveillance**. Automatic calculation takes place when the server receives new data from the instrument according to the following examples:

- **Minimum intervals [minutes]**: If set to 5, the server will not recalculate flags in spite of the fact that the instrument uploads lots of samples, logs, etc. It will delay the recalculation 5 minutes.
- **Maximum intervals [minutes]**: If set to 15, even if no data was received from the instrument it will recalculate after 15 minutes.

Report Templates

On this tab customer designed report templates can be linked to the network. The new report templates are accessible only in the Veision Air Manager Network but not in the Vision Air Routine (client).

When a template has been imported or linked, a report based on the template can be generated in the **Report** menu.

Press **[Remove]** to remove a template.

Press **[Export...]** to save the template file and to use it on other networks.

Standardization Groups

This functionality is not used with the current Metrohm product line.

For DS2500 instruments, standardization gruops can be defined to define a set of DS2500 instruments that use the same standardization file. Use standardization files to apply instrument adjustments to prediction models that were developed in other softwares. Prediction models that can be used in more than 1 software are called **combined prediction models**. When a standardization file is imported, it is linked to the prediction model of the instrument.

Data Cleanup

Under this tab the user can enable data cleanup and set the interval (months) between automatic deletion of old samples. The default value is 36 months. Date and time of the last cleanup is stated at the bottom of the dialog window.

To delete all samples from the current date, press **[Cleanup now]**.

Samples included in static sample list and samples with reference values are not deleted.

Security

On the **Security** tab Vision Air has support for **Authenticated mode** for Vision Air Manager. This means that prediction models on the individual instrument will become unusable unless the instrument is connected with the Vision Air Server within a given time frame. It is based on time limited licenses for authenticated prediction models. This means that the prediction will no longer work if these licenses are not renewed by the Vision Air Server in due time.

Authentication model level:

- The use of authenticated mode is optional and off by default.
- An entire Vision Air Network or individual instrument groups in the network can be authenticated.

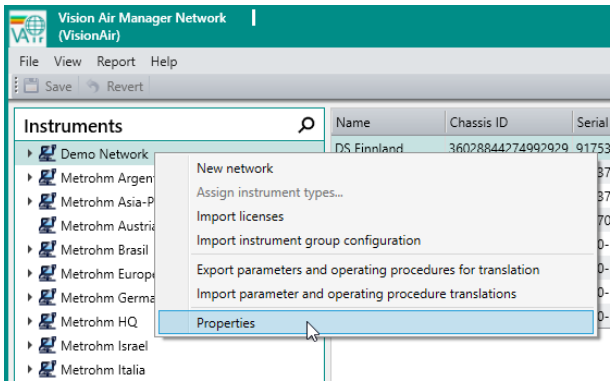
If an authenticated prediction model fails on Vision Air because the instrument has not been in contact with the Vision Air Server within the grace period (default setting is 14 days), then the following message appears:

Authenticated prediction model: <PM> has not been authenticated by the Vision Air Server within the grace period.

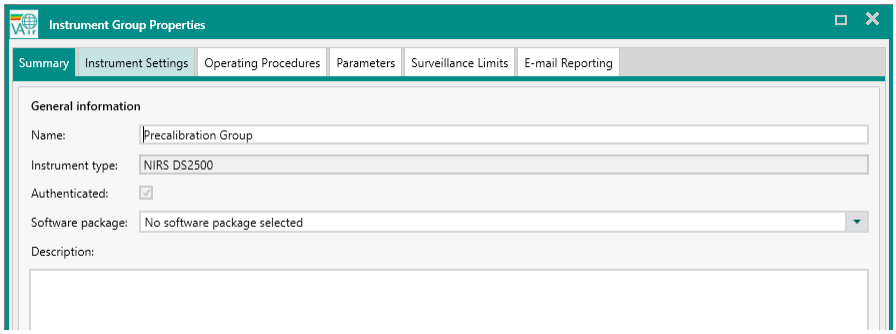
Check that instrument is connected to the Vision Air Server and contact your Network Manager if the problem persists.

3.1.3 Instrument group settings

To define instrument group settings, right-click on an instrument group and select **Properties**.



The instrument group properties contain the following work tabs:



Summary

The **Summary** tab displays the following information about the group:

- **Name**
  Name of the instrument group.
- **Instrument Type**
  This field is read-only and cannot be changed.

- **Authenticated**
  If this option is activated, then DS2500 instruments in an instrument group require regular connection with the Vision Air Server to use the provided operating procedures.
  In the work tab **Summary**, this option is read-only. Activate or deactivate **Authentication** under **Network Properties** on the work tab **Security** *(see "Security", page 12)*.
- **Software Package**
  Only 1 default software package is available for Vision Air.
- **Description**
  Optional description that can be added by the user.

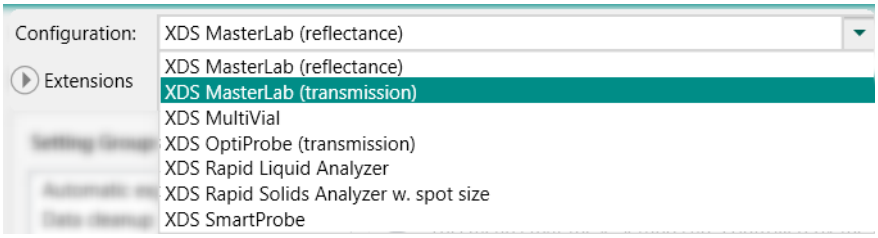
Instrument Settings

Details on the instrument settings are displayed under the **Instrument settings** tab. Some settings are read-only.

Some instrument settings, e.g. **Instrument diagnostics** can only be modified for a complete instrument group. Instrument settings that can be set for single instruments are changed in the work tab **Instrument Settings**.

Advanced settings can be displayed by activating the advanced view under **View** ▶ **Options** ▶ **Display advanced settings**. Advanced settings are only active for the current session. After a restart of Vision Air Manager, the display is reverted o the basic view. Advanced settings should only be modified by Metrohm representatives or after consultation with a Metrohm representative.

If different XDS modules have been used with Vision Air in the past, the individual modules are selectable in the configuration drop-down list.



The following instrument settings are available:

Automatic synchronisation

Settings for automatic synchronisation with the Vision Air Server. Define the interval to check for new updates. Define whether data should be uploaded automatically. If you enable this option, define an interval for the upload of data. Define a delay for automatic sample upload.

Check-samples (only available for DS2500 instruments)

Settings to define the behavior when using operating procedures with check samples.

If **Check-sample reminders enabled** is checked, the user is reminded to analyze a check sample in the given interval (default setting: every 48 hours). The user has a grace period in which a successful check sample should be analyzed (default setting: 2 hours). If the user fails to analyze a successful check sample, the normal samples are marked with a warning if **Mark samples after unsuccessful check-sample** is checked.

Check samples are physical samples that can be considered stable over some period of time. They are used as an additional verification of the instrument performance *(see "Check samples", chapter 3.3.4, page 67)*.

Common hardware selftest limits (only available for DS2500 instruments)

Read-only view for self test limits. These parameters are defined within the firmware of the instrument.

Data cleanup

Settings to define if and when normal samples or check samples should be automatically deleted.

Diagnostic test reminders

Settings to enable an automatic reminder in Vision Air Routine to conduct a low-flux test, a wavelength certification or a photometric test. The following options are available:

- Enabled: If active, the user is reminded to perform the instrument diagnostic test.
- Interval: Frequency of instrument diagnostic tests (in days).
- Grace period: Time that remains until the user has to perform the instrument diagnostic test (in hours).
- Action on expiration or failure: Definition of what happens if no test was performed after the defined time. This ensures that data is only measured with properly working instruments. The user can either disable the measurement completely or flag the measured samples with an error.

Instrument diagnostics

Settings for the instrument diagnostic test that is conducted in Vision Air Routine. If the automatic instrument diagnostic test is deactivated, then the automatic test does only run if the last conducted test failed, was canceled or was never performed.

If the instrument diagnostic test reminder is enabled, it reminds the user to perform an instrument diagnostic test in the given interval (default setting: every 8 days). The user has a grace period to perform a successful test (default setting: 2 hours). If the user fails to perform a successful test, the normal samples are marked with a warning or the measurement is disabled. This depends on the selected option in Vision Air Manager.

Run start-up test.

- XDS instruments:
  Always: The start-up test runs on every startup of Vision Air Routine.
  After unsuccessful diagnostic test: The start-up test only runs if a diagnostic test failed.
- DS2500 instruments:
  After unsuccessful diagnostic test or instrument restart: The start-up test only runs if a diagnostic test failed or the instrument has been restarted.
  After unsuccessful diagnostic test: The start-up test only runs if a diagnostic test failed.

Report templates

Section for the import of report templates that are available in the **Tools** section in Vision Air Routine. Only sample-related templates can be imported in this section (the same restrictions apply as for report templates that are imported in the automatic export and print format sections).

Operating procedures

The **Operating procedures** tab lists the linked operating procedures.

Operating procedures can be added and removed (**[Add...]** / **[Remove]**) by the user. By clicking **[Apply]**, changes are applied immediately (window is not closed). By clicking **[OK]**, changes are applied immediately and the window is closed.

Parameters

The order of parameters (**Parameter display order**) is defined in **Parameter profiles** and is global for a given network. Under the **Parameters** tab it is also possible to define a display order for an instrument group. I.e. to accommodate different customers that participate in a network.

Surveillance Limits

The surveillance limits are settings that define when a flag in the surveillance section is displayed. Parameters regarding the following topics can be set:

- Connectivity
  - Ping limit
  - Download limit
  - Upload limit
- Analysis results
  - Outlier limit
  - Product limits = Operating procedure limits
- General events
  - Error limits
  - Warning event limits

E-mail Reporting

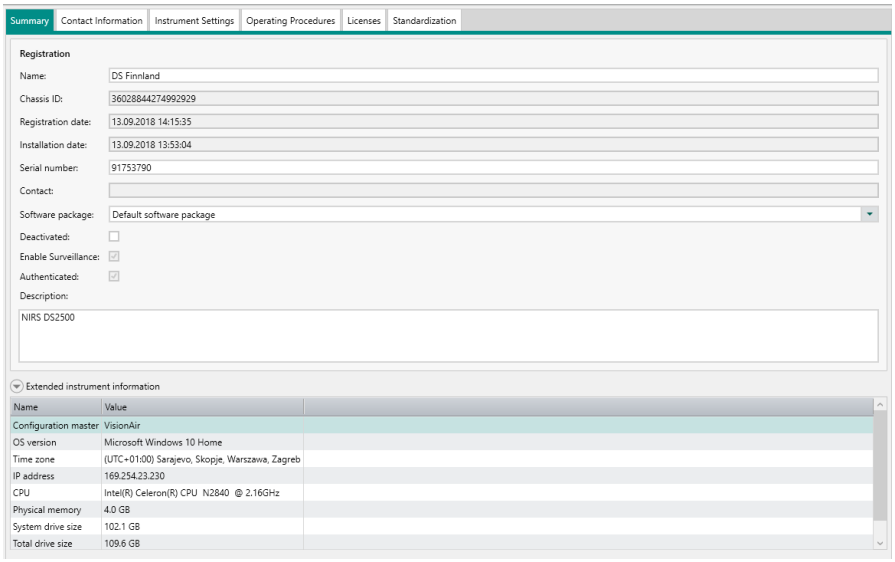
In the upper section of this tab the user can select the settings for the automatic e-mail report. The e-mail report is sent to the instrument contact persons. Select a report interval (**Never**/**Weekly**/**Monthly**) and a report (**Instrument status**/**Flags log**).

The lower section of this tab lists e-mail alert recipients. An e-mail alert is sent to the recipients when a surveillance limit has reached a warning/error limit. Click **[Add...]** or **[Remove]** to add/remove recipients from the list.

Instrument Search

In the **Instruments** and **Surveillance** area it is possible to search for specific instruments. Clicking on the magnifier icon will bring up the instrument search view. Here it is possible to search by using a combination of instrument type, name and serial number.

3.1.4 Instruments section



All instrument related settings are made in the **Instruments** section in Vision Air Manager.

The **Instruments** section contains the following work window tabs:

Summary

The **Summary** tab contains the general information on the instrument. Here, the instrument name can be defined and a description of the instrument can be added. The following instrument specific information is displayed as read-only:

Chassis ID

Specific instrument ID.

Registration date

Date of the registration of the instrument with the server. In Vision Air Network, the registration date and the installation date may differ.

Installation date

Date of the first connection of the instrument with Vision Air Routine.

Serial number

Serial number of the monochromator.

Contact

The contact person is set in the **Contact information** tab.

Software package

Only 1 default software package is available for Vision Air.

Deactivated

The user can deactivate the current instrument. Deactivate an instrument to remove the instrument from the Vision Air Manager Network.

Enable Surveillance

In the **Instruments** section, the setting **Enable surveillance** is read-only.

In the **Surveillance** section, the user can check/uncheck the check box **Enable surveillance**. After disabling, the instrument is not flagged anymore, for example after a failed instrument diagnostic test.

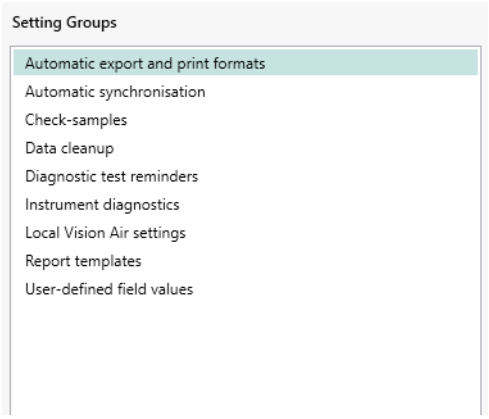
Contact information

The **Contact information** functional area contains information about the person who is responsible for the instrument.

Contact persons are created in the **Users** section. To select a contact, click on **[Pick another contact]**, select a contact in the pop-up window and press **[OK]**.

In the **Instrument location** functional area, it is possible to enter the GPS location and time zone of the instrument:

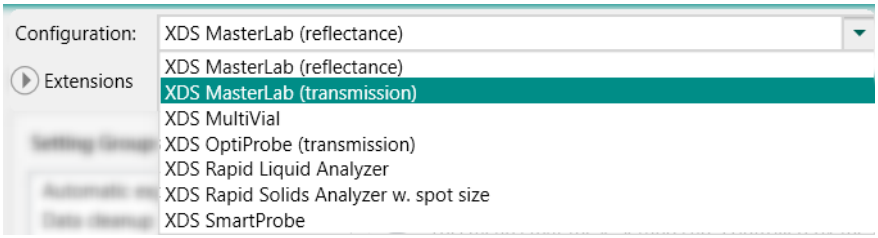
Instrument settings



Some settings are read-only. These settings can only be modified for the complete instrument group *(see "Instrument group settings", chapter 3.1.3, page 13)*.

Details on the instrument settings are displayed under the **Instrument settings** tab. Settings in this work tab are read-only. Modifications of the settings are done in the instrument group setting area *(see "Instrument group settings", chapter 3.1.3, page 13)*.

If different XDS modules have been connected with Vision Air Server in the past, the individual modules are selectable in the configuration drop-down list.



The following instrument settings are available:

Automatic export and print formats

Settings to define which templates should be printed automatically and which templates should be created automatically after a measurement in Vision Air Routine. Set the storage location and the final activation of this procedure in Vision Air Routine under **Tools** ▶ **Settings** ▶ **Export or print**.

You can import additional report templates for automatic export options with the **[Import]** button. The newly imported reports are available for selection for automatic export. Only sample related templates can be imported in this section.

Check-samples (only available for DS2500 instruments)

Settings to define the behavior when using operating procedures with check samples.

If **Check-sample reminders enabled** is activated, the user is reminded to analyze a check sample in the given interval (default setting: every 48 hours). The user has a grace period in which a successful check sample should be analyzed (default setting: 2 hours). If the user fails to analyze a successful check sample, the normal samples are marked with a warning if **Mark samples after unsuccessful check-sample** is activated.

Check samples are physical samples that can be considered stable over some period of time. They are used as an additional verification of the instrument performance self test *(see "Check samples", chapter 3.3.4, page 67)*.

Common hardware selftest limits (only available for DS2500 instruments)

Read-only view for self test limits. These parameters are defined within the firmware of the instrument.

Data cleanup

Settings to define if and when normal samples or check samples should be automatically deleted.

Diagnostic test limits (only available for DS2500 Solid Analyzer and XDS instruments)

In this setting, a Metrohm representative can add different configurations for the test limits.

Diagnostic test parameters (only available for DS2500 Solid Analyzer and XDS instruments)

Settings where the number of test runs for low-flux tests and for wavelength certification tests is defined. Reference correction files are stored on the USB flash drive that is delivered with the individual standard sets, e.g. standard set 6.7450.010. These reference correction files can be stored permanently in Vision Air Manager. With this, the user does not need to insert the USB flash drive and select the file during diagnostic tests. The validity of files and standards is typically 1 year and can be renewed by a recertification. Contact your local Metrohm agency for details regarding a recertification.

The following options are available:

- Number of reference subscans: Average of subscans (read-only).
- Number of WSR (wavelength standard reflectance) subscans: Average of WSR subscans (read-only).
- Number of low-flux test runs: Average of low-flux test runs.
- Number of wavelength certification test runs.

- Show only valid standard sets in Vision Air Routine: Standards have a due date. If the check box is activated, only standards where the due date is OK are displayed.
- External references: Add additional reference files here.

Diagnostic test reminders (only available for DS2500 Solid Analyzer and XDS instruments)

Settings to enable an automatic reminder in Vision Air Routine to conduct a low-flux test, a wavelength certification or a photometric test. The following options are available:

- Enabled: If active, the user is reminded to perform the instrument diagnostic test.
- Interval: Frequency of instrument diagnostic tests (in days).
- Grace period: Time that remains until the user has to perform the instrument diagnostic test (in hours).
- Action on expiration or failure: Definition of what happens if no test was performed after the defined time. This ensures that data is only measured with properly working instruments. The user can either disable the measurement completely or flag the measured samples with an error.

Flash settings (only available for DS2500 instruments)

Low level settings that can be helpful for support activities. Flash settings are read-only. These settings are defined within the firmware of the instrument.

Hardware self test limits (only available for DS2500 instruments)

Read-only view for instrument specific settings. The settings are defined within the firmware of the instrument.

Hardware sensor limits (only available for DS2500 instruments)

Read-only view for instrument specific settings. The settings are defined within the firmware of the instrument. The current DS2500 product line does not use the settings.

Instrument calibration settings (only available for DS2500 Solid Analyzer)

Read-only view for instrument specific settings. The settings are defined within the firmware of the instrument.

Instrument diagnostics

Settings for the instrument diagnostic test that is conducted in Vision Air Routine. If the automatic instrument diagnostic test is deactivated, then the automatic test does only run if the last conducted test failed, was canceled or was never performed.

If the instrument diagnostic test reminder is enabled, it reminds the user to perform an instrument diagnostic test in the given interval (default setting: every 8 days). The user has a grace period to perform a successful test (default setting: 2 hours). If the user fails to perform a successful test, the normal samples are marked with a warning or the measurement is disabled. This depends on the selected option in Vision Air Manager.

Run start-up test.

- XDS instruments:
  Always: The start-up test runs on every startup of Vision Air Routine.
  After unsuccessful diagnostic test: The start-up test only runs if a diagnostic test failed.
- DS2500 instruments:
  After unsuccessful diagnostic test or instrument restart: The start-up test only runs if a diagnostic test failed or the instrument has been restarted.
  After unsuccessful diagnostic test: The start-up test only runs if a diagnostic test failed.

Local Vision Air settings

Read-only view for file storage options in Vision Air Routine. Define the settings directly in Vision Air Routine.

Report templates

Section for the import of report templates that are available in the **Tools** section in Vision Air Routine. Only sample-related templates can be imported in this section (the same restrictions apply as for report templates that are imported in the automatic export and print format sections).

Stability test limits (PbS, Si or InGaAs)

Noise test limits for the individual detectors.

- Drift noise limit
- Random noise limit

Do not change factory settings yourself. Ask a Metrohm representative for assistance.

Performance test parameters (only available for XDS instruments)

Settings for the total amount of test runs, noise (reference) and number of wavelength (WSR) scans that are performed during the instrument diagnostic test.

Stability test parameters

Settings for duration and acceptance limits for stability tests that are conducted during the instrument diagnostic test. The following options are available:

- Maximum test time: Maximum run time for the stability test. The maximum test time defines the maximal testing time for both stability tests: The lamp temperature stability test and the stability test (noise values).
- Number of reference subscans: Average of subscans.
- Number of scans: Number of measurements.
- Wait for a stable bias timeout (only available for XDS instruments): Noise test.

The tests can end before the total test time is reached if the test values, e.g. noise values, are below the set acceptance criteria. The maximum test time includes the test time for lamp stabilization and for noise bias.

With the DS2500 series, the number of scans and subscans can be defined.

Subscan settings (only available for DS2500 instruments)

Read-only view for subscan settings. The settings are defined within the firmware of the instrument.

User-defined field values

Handling of values in user-defined fields. If the check box is activated, the values entered by the user are stored. Set the period how long a user-defined value is stored in the input field during sample registration.

Wavelength test limits (PbS, Si or InGaAs)

Wavelength test limits for the individual detectors. For the DS2500 series, the bandwidth limits can also be set. The following options are available:

- Bandwidth accuracy limit
- Bandwidth repeatability limit
- Wavelength accuracy limit
- Wavelength repeatability limit

Do not change factory settings yourself. Ask a Metrohm representative for assistance.

Wavelength test parameters (only available for DS2500 instruments)

Settings for the instrument diagnostic test. The following options are available:

- Number of reference scans: Average of scans.
- Number of test runs: Number of measurements.
- Number of WSR (wavelength standard reflectance) subscans: Average of WSR scans.

Operating procedures

The working tab **Operating Procedures** displays operating procedures that are linked to the selected instrument.

Licenses

In this section, licenses for the instrument can be imported and deleted.

Licenses can be imported to enable routine measurement and to activate secured prediction models that are provided with Metrohm pre-calibrations. Licenses, except demo licenses, are always instrument (monochromator) specific.

Standardization (only available for DS2500 instruments)

By using a standardization file, it is possible to apply instrument adjustments to prediction models that were developed in other softwares. Prediction models that can be used in more than 1 software are called combined prediction models. When a standardization file is imported, it is linked to the prediction model of the instrument.

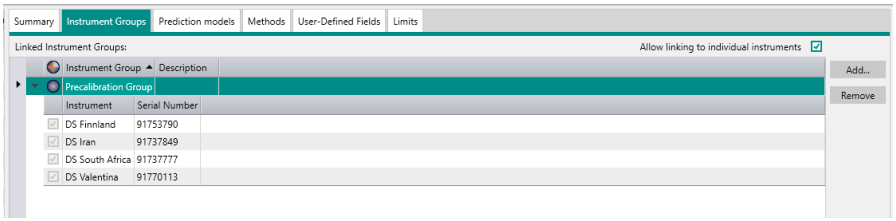
Click on **[New group]** if multiple instruments should use the same standardization. Delete groups by clicking **[Delete group]**.

Click on **[Link file]** to browse and link a prediction model to a standardization file (*.std).

Remove a linked file by selecting a file under the standardization tab and click on **[Remove file]**.

This functionality is not used with the current Metrohm product line.

3.1.5 Operating procedures section



All settings related to operating procedures are set in the **Operating procedures** section.

Prediction models, methods and user-defined fields are linked with the respective operating procedure in the **Operating procedures** section.

Lower and upper warning limits and intervention limits are defined in the **Operating procedures** section.

The structure window lists all available operating procedures and operating procedure groups ( ) of the instrument.

Operating procedure groups can be created by right-clicking on the structure window and selecting **New operating procedure group**. Operating procedures can be assigned to operating procedure groups by right-clicking on the individual operating procedure and selecting **Move to**

operating procedure group. Operating procedure groups allow to structure operating procedures.

The **Operating procedures** section contains the following work window tabs:

Summary

The **Summary** tab shows the following general information on the highlighted operating procedure in the structure window.

- The name of the selected operating procedure.
- The operating procedure code. It must be defined to export operating procedures via **File** ▶ **Export** ▶ **Configuration**. We recommend naming the code identically to the operating procedure.
- The sample type. It defines the kind of sample to be measured. The following sample types are available.
  - Normal: Standard samples for quality control.
  - Check sample (only available for DS2500 instruments): Physical samples that can be considered stable over a period of time. Check samples are used as an additional verification of the instrument performance *(see "Check samples", chapter 3.3.4, page 67)*.
  - Standardization (only available for DS2500 instruments): Standardization samples are used for instrument calibration. Currently, Vision Air does not support this functionality.

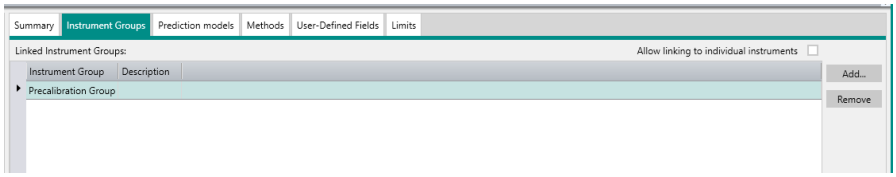
Select the appropriate operating procedure type from the **Type** drop-down list.

The selected type determines the list of icons. Any icon can be selected if the **Show all icons** check box is activated.

An icon can be selected with the **Icon** drop-down list. The selected icons are displayed in Vision Air Routine.

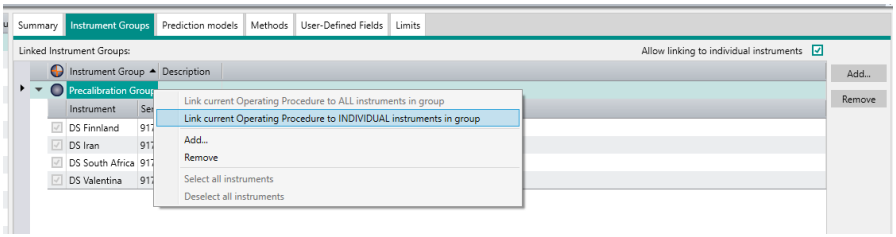
By default, all new operating procedures are active. The check box **Active** is activated. When the user deactivates an operating procedure, the operating procedure is no longer displayed in Vision Air Routine.

Instrument groups



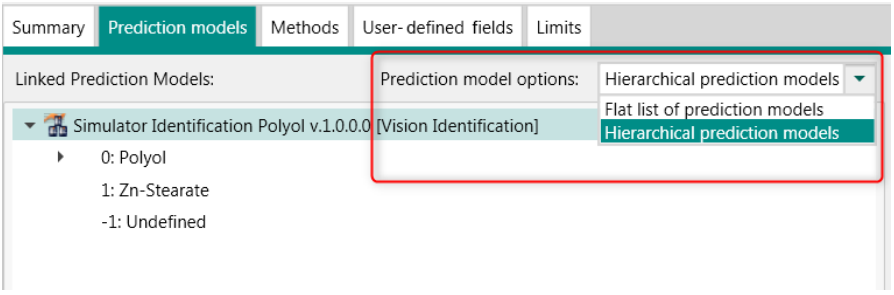
In this working tab the selected operating procedure can be added to the individual instrument groups. If the checkbox **Allow linking to individual instruments** is active, then the operating procedure can be linked to an individual instrument. After activating the checkbox, the instrument

groups are displayed as drop-down lists. The drop-down lists show all available instruments in a group. To activate individual selection, right-click on a group and select **Link current Operating Procedure to INDIVIDUAL instruments in group**.

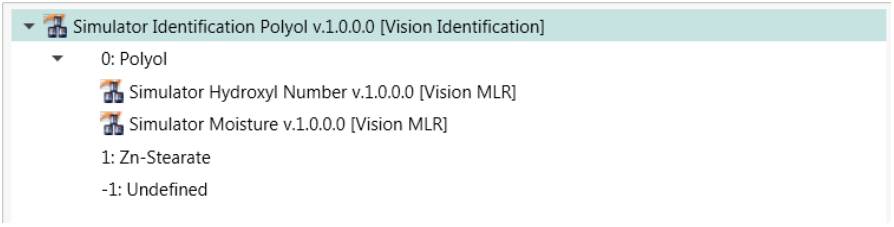


Prediction models

Prediction models can be linked to operating procedures. The hierarchical prediction model view allows to link prediction models with products or other prediction models.



In the displayed example, on the first level, a sample identification is conducted. On the second level, if identified as a polyol, Vision Air conducts a quantification of the hydroxyl number and the moisture.



In order to link individual prediction models or operating procedures, select the prediction model or operating procedure you want to link with another prediction model. Click on **[Add]** or right-click on the prediction model or operating procedure. This function enables the configuration of workflows, e.g. a quantification is only performed in Vision Air Routine if the product has been identified correctly.

Methods

Methods can be linked to operating procedures. Multiple methods can only be linked with 1 operating procedure when using the XDS analyzer

series. We do not recommend using multiple methods within the same operating procedure in Vision Air Local.

User-defined fields

User-defined fields can be linked to operating procedures.

Limits

Warning limits and intervention limits can be set for operating procedures.

The limits can be set for each instrument individually by activating the checkbox **Allow instrument specific Operating Procedure limits**.

There are 3 types of operating procedure limits:

- Absolute
- Relative
- Differential

The figure below illustrates the difference between the types:

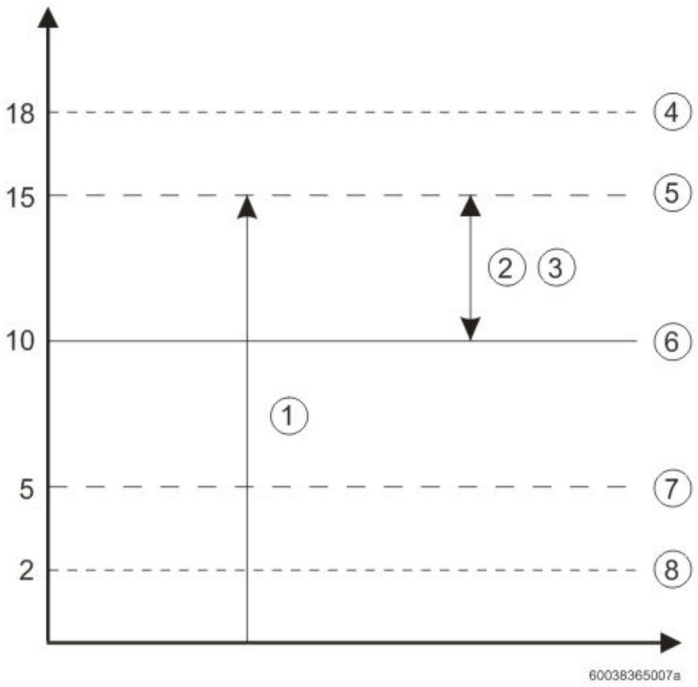


Table 3

1	**Absolute** upper warning limit = 15
2	**Relative** upper warning limit = 50%
3	**Differential** upper warning limit = 5
4	Upper intervention
5	Upper warning

6	Target
7	Lower warning
8	Lower intervention

The target value is always absolute. The differential limit is essentially a distance between corresponding absolute limit and target.

- Absolute Upper Action = Target + Differential Upper Action
- Absolute Upper Warning = Target + Differential Upper Warning
- Absolute Lower Action = Target - Differential Lower Action
- Absolute Lower Warning = Target - Differential Lower Warning

A target value needs to be defined for a relative limit. When using check samples and a check sample operating procedure, the target value is defined by the value of the check sample operating procedure *(see "Check samples", chapter 3.3.4, page 67)*.

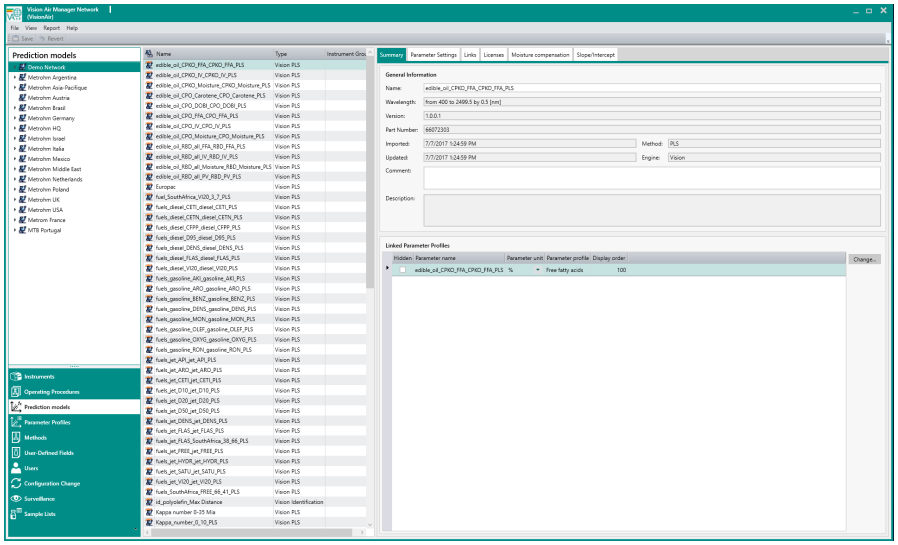
Example of relative limits:

Prediction Model	Parameter Profile	Type	Lower Action	Lower Warning	Target	Upper Warning	Upper Action
lacfruc	Lactose Content	Relative	9,00	6,00	10,00	6,00	9,00

- Lower Action Level: 10-9 % = 10-(0.09x10) = 9.1
- Lower Warning Level: 10-6 % = 10-(0.06x10) = 9.4
- Upper Warning Level: 10+6 % = 10+(0.06x10) = 10.6
- Upper Action Level: 10+9 % = 10+(0.09x10) = 10.9

Limits of prediction models can be imported/exported as .csv files. Highlight a prediction model and press **[Import]** and **[Export]** from the **File** menu to open the browser window.

3.1.6 Prediction models section



Prediction models are algorithms correlating NIR spectra to properties of the sample, e.g. water concentration.

Each prediction model is linked to 1 parameter profile.

4 different prediction model types can be created by right-clicking on the data window screen.

- Imported prediction models
  Imported prediction models are standard prediction models for routine analysis that were created in Vision, PLS_Toolbox or The Unscrambler.
- Calculated prediction models
  Calculated prediction models allow automatic post-processing of values that were evaluated with imported prediction models. Calculated prediction models can also use values from user-defined prediction models *(see "Calculated prediction models", chapter 3.3.6, page 70)*.
- User-defined prediction models
  User-defined prediction models are values that routine users enter during measurements. These values can be further used with calculated prediction models. A typical user-defined prediction model is a temperature value *(see "User-defined prediction model ", chapter 3.3.7, page 75)*.
- Placeholder prediction models
  Placeholder prediction models are only used to collect data and are therefore not predicting any result.

The **Prediction models** section contains the following work window tabs.

The tabs that are displayed in the **Prediction models** section depend on the type of selected prediction model.

Summary

The Summary tab contains general information and settings of the prediction models.

The **General information** field shows the following parameters.

- Name of the selected prediction model.
- The standardization group setting is only available for imported prediction models and user-defined prediction models.
  A standardization group is a logical group of instruments with linked standardization files. The standardization group defines a standardization file for each instrument that belongs to the group. This function is not needed for the current Metrohm product line.
- The wavelength range of the system is displayed for imported quantitative prediction models, e.g. 400 - 2499.5 nm for a reflection XDS instrument or DS2500 instrument.
- The version number is automatically updated when an existing prediction model is imported again and updated.
- The part number displays a serial number for protected prediction models.

- The imported and updated dates display the date when the prediction model was imported and updated. If no update has been conducted yet, the imported and updated date are identical.
- Method displays which algorithm was used to create the prediction model.
- Engine displays which software was used to create the prediction model.

The **Linked parameter profiles** area shows a list of the linked parameter profiles.

The link to a parameter can be changed by clicking on **[Change...]** and selecting another parameter profile in the pop-up window.

When the check box in the column **Hidden** is checked, Vision Air Routine does not show the parameter information.

Click on **Parameter unit** to display a list of all available Vision Air units.

In order to select a new unit, an appropriate parameter profile that uses the new unit must be selected by clicking on **[Change]**. Changing the unit does not affect prediction values or samples that were already analyzed with this parameter (unit is just a parameter attribute displayed with the prediction value).

Parameter settings

Quantitative prediction models

For quantitative prediction models, the **Parameter settings** work section allows to define which data points should be taken into account for slope corrections and intercept corrections.

The moment when a slope correction and intercept correction should be applied can be defined.

To conduct a slope correction or intercept correction, create a sample list in the **Sample lists** section. Perform the correction in the **Sample lists** section or in the **Prediction models** section in the **Slope / Intercept** tab *(see "Slope/intercept calculations", chapter 3.3.8, page 75)*.

Identification prediction models

A list of all products and the according parameter output is displayed in the **Output values option**. The output can be renamed in the section.

Define the warning threshold in Vision Air Routine in **Qualification options**. Here, you can also define whether the actual distance of the sample is displayed or not.

Qualification prediction models

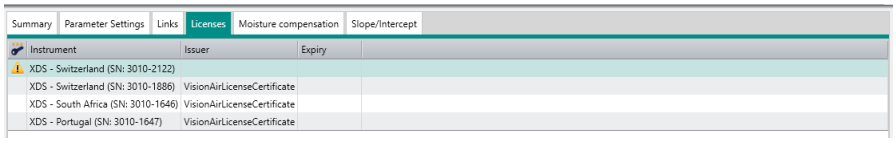
Define the parameter output in the **Output values option**. Define the parameter output for the 3 categories good, warning and bad. Select the warning threshold in **Qualification options**.

Links

The link section provides an overview over all operating procedures that use the selected prediction model. If the selected prediction model has been copied, a list of all existing copies can be displayed.

Licenses

The **Licenses** work tab is available only for prediction models that require a license. In the **Licenses** work tab all instruments that use the prediction model are displayed. The tab shows whether a valid license is present or not.



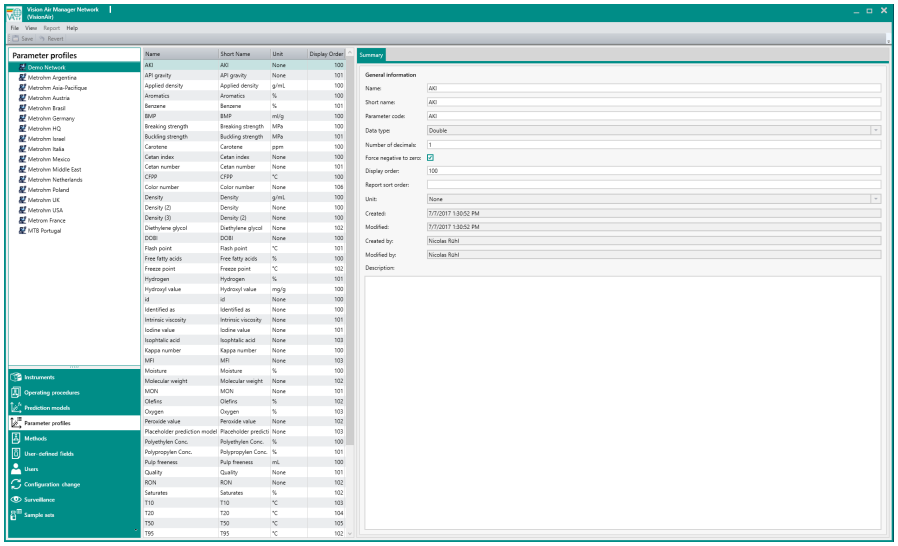
Moisture compensation

Activate or deactivate moisture compensation. This functionality is not used with the current Metrohm product line.

Slope/intercept

Apply a slope and/or intercept correction to a quantitative prediction model *(see "Slope/intercept calculations", chapter 3.3.8, page 75)*.

3.1.7 Parameter profiles section



Parameter profiles define the parameter to be analyzed in accordance with the linked prediction model, e.g. a parameter profile for a prediction model to quantify water content is water in %.

The **Parameter profiles** section contains the following work window tab:

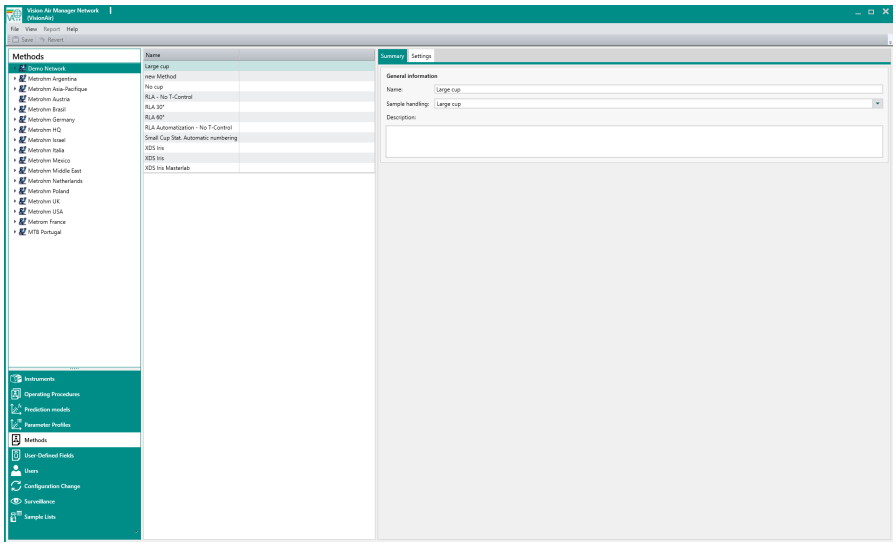
Summary

The summary tab contains general information and settings of the parameter profiles. The **General information** field shows the following parameters:

- The name is displayed in Vision Air Manager Network.
- The short name is displayed during result display in Vision Air Routine.
- The parameter code is used to import reference values with .csv files in Vision Air Routine *(see "Importing reference values with a .csv file", chapter 3.3.3, page 67)*.
- The data type defines to which kind of prediction model the parameter profile can be linked.
  - Parameter profiles for identification and qualification prediction models are defined by selecting the **String** data type.
  - Parameter profiles for quantification prediction models are defined by selecting the **Double** data type.

  When selecting the data type Double, the unit can be selected. The selected unit is displayed in the result view in Vision Air Routine. When linking prediction models to parameter profiles in the **Prediction models** section, only parameter profiles that fit to the selected unit of the prediction model are displayed.
  Placeholder prediction models have been defined to be linked to parameter profiles with the **Double** data type. Placeholder prediction models are only used to collect data and are therefore not predicting any result.
- By activating the check box **Force negative to zero**, users see '0' when a result value is negative.
- The **Display order** field has the last generated display order number plus 1 by default. The counting starts with 100. Avoid generating 2 profiles with the same display order number. This setting determines the order in which parameters are displayed in the **Samples** view in the **Surveillance** section and in the **Result** view in Vision Air Routine.
- The **Report sort order** setting determines how parameter columns are ordered in the sample detail and sample list reports. The counting starts with 100.

3.1.8 Methods section



Methods describe the way a measurement is conducted, e.g. number of repetitions or sample temperature during an analysis.

In Vision Air Manager for XDS, a method can be created for the different available modules.

In Vision Air Manager for DS2500, only methods for DS2500 instruments can be created.

Methods are added by right-clicking on the ⚙ icon of the individual module or instrument and selecting **[Add method]**.

The **Methods** tab contains the following work window tabs:

Summary

- Definition of the method name.
- Definition of the sample vessel in the drop-down menu sample handling.

Settings

The Setting tab contains detailed settings of the method with respect to the selected sample vessel.

The following settings are available.

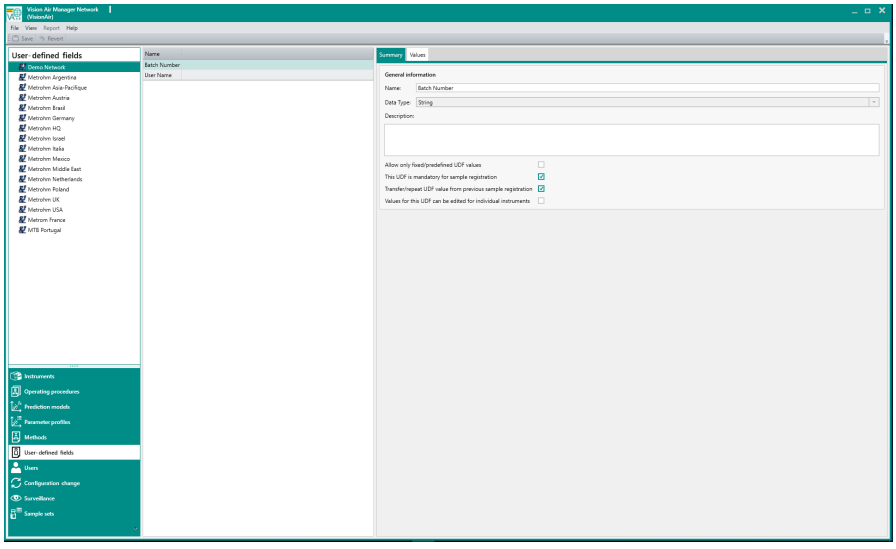
- Analysis
  The user can define whether the instrument should perform an autolinearization (x-axis correction) before each scan. Metrohm suggests to keep this setting active.
  The number of reference subscans can be defined. The default value is 32.
  The frequency of reference scans can be defined under **Run reference scan after warm-up**. For XDS instruments a value in minutes can be entered. The default value is 0. 0 represents a reference scan before each measurement. For DS2500 instruments, 4 options are available. Warm-up time refers to the time period when Vision Air Routine is first started. The user can modify the length of the warm-up time (only available for XDS instruments). The default value is 120 minutes. During warm-up time, a reference scan is conducted before each measurement by default.
- Automatic start control (only available for DS2500 Liquid Analyzer)
  If the checkbox **Automatic start** is checked, the measurement starts automatically after closing the lid of the DS2500 Liquid Analyzer.
- Display options
  The user can define which information is displayed about the sample vessel and outliers during a routine analysis. Comment fields can be activated or deactivated during sample registration. Comment fields can be set as mandatory.
- Liquid setup (only available for DS2500 Liquid Analyzer)
  If the checkbox **Check sample vessel type** is enabled, the system checks whether the inserted sample vessel matches with the sample vessel defined in the method.
  Defines options regarding the temperature of the sample holder and the sample *(see "Heating and cooling the sample", page 81)*.
  Defines whether there is a delay before a scan starts and the length of the delay. With a delay before a scan, you can ensure that the sample has the same temperature as the sample holder.
- Illumination (only available for XDS instruments)
  Setting to adjust the spot size.
- Repetition
  Definition of the number of subscans per measurement. The default value is 32. For a DS2500 instrument with a large cup, small cup moving and slurry cup the number of subsamples (additional measuring points) can be defined.
  If the user wants to average multiple cups or vials, the user can define the number of cups/vials per sample.
- Sample numbering
  Defines the procedure during sample registration in Vision Air Routine. Manual or automatic sample numbering is possible. The codes that define strings during automatic sample numbering are described in detail *in chapter 3.3.1, on page 61*.

- Storage options
  Defines which information about spectra should be stored. Beside the spectra (read only), subsamples and the full raw data can be stored. Subsamples are created when multiple positions are analyzed within 1 measurement, e.g. with the DS2500 large cup. The full raw data is not accessible with the current Metrohm product line.

When activating the advanced option view under **View ▶ Options ▶ Display advanced settings**, additional settings are available.

- Automatic export and print
  Allows to activate/deactivate automatic print and export procedures. This option applies to operating procedures that are linked with a method.
- Check sample operating procedure
  Shows the number of replicates (read-only).
  If the checkbox **Pass/fail visualization** is enabled, the predicted result is shown. If the checkbox is not enabled, only a pass / fail information is shown.
- Compatibility (only available for DS2500 Solid Analyzer)
  Allows all spectra to be collected to be compatible with old 6500/5000 System II series. This functionality is not used anymore with the current Metrohm product line.
- RFID (only available for DS2500 Solid Analyzer)
  Activation and deactivation of RFID recognition. This functionality is not used with the current Metrohm product line.

3.1.9 User-defined fields section



The **User-defined fields** section contains the following work window tabs:

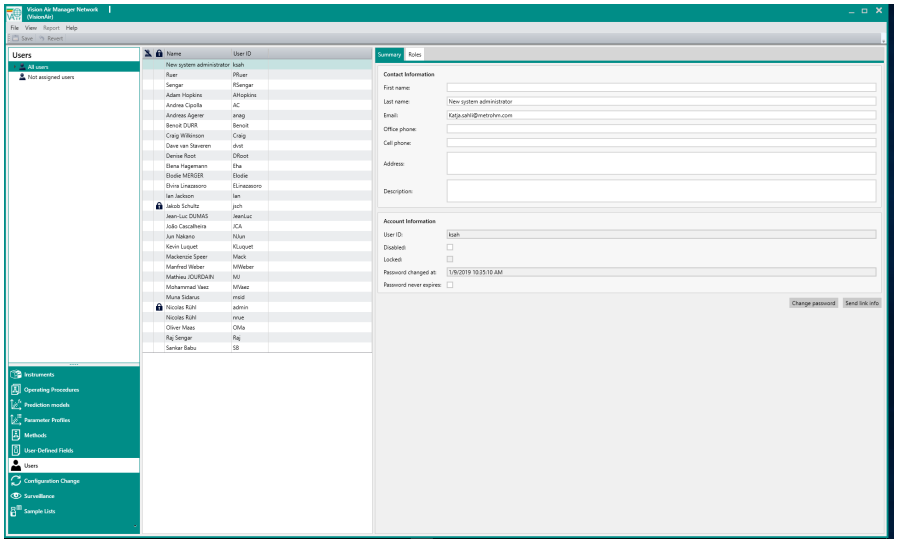
Summary

- The name of the user-defined field.
- Settings that affect the behavior of the user-defined field during sample registration.

Values

Creating, deleting and editing values of user-defined information.

3.1.10 Users section



The **Users** section lists all users.

Users can be created, deleted and edited.

The **Users** section contains the following work window tabs and settings:

Users that were created with no user role are displayed in the **No assigned users** section.

The **Users** section contains the following work window tabs:

Summary

- The user can define a user name and further contact information, for example e-mail address, phone number and working address.
- Information and settings regarding the individual users.
- By activating the check box **Disabled** in the **Account information** area, the user is not able to log in and the following message appears: "The system could not log in. Make sure the user name is correct, and type your password again. Letters must be typed using the correct case".
- A user is locked if they type in a wrong password 3 times (default values). To unlock a locked user, select the user in the structure window and deactivate the checkbox next to **Locked**.

- To change the password, click on **[Change password]**, fill out the **Password**, **Confirm password** fields and click on **[OK]**.
- Date and time when the user's password was last changed is shown in the **Password changed at:** field.
- By activating the check box **Password never expires** in the contact information of a specific user, the user is never asked to change the password.
- Send the Vision Air Manager Network installer to a selected user with the **[Send link info]** button. To send the information an e-mail address needs to be intered in the field **Email**.

Roles

Select a user to see the assigned networks, instruments groups and instruments.

Add or remove networks, instruments groups or instruments with **[Add]**/ **[Remove]**.

Check **Is System Administrator** to grand administrator rights to the selected user.

User roles and descriptions

- Instrument User
  Access to an instrument in Vision Air Routine. Which instrument the Instrument User has access to is defined by the Network Manager or the System Administrator. System Administrators and Network Managers can create/modify Instrument User accounts. Only System Administrators can delete Routine User accounts.
- Group Manager
  Access to group(s) of instrument(s) in Vision Air Manager. Which group(s) and instrument(s) the Group Manager has access to is defined by the System Administrator. System Administrators can create/delete/ modify Group Manager accounts.
- Network Manager
  Full access to network(s) with group(s) of instrument(s) in Vision Air Manager. Which network(s), group(s) and instrument(s) the Network Manager has access to is defined by the System Administrator. System Administrators can create/delete/modify Network Manager accounts. A Network Manager can modify his/her own account but no other Network Manager accounts.
- System Administrator
  Full access to all networks with group(s) of instrument(s) in Vision Air Manager. Only System Administrators can create/delete/modify other System Administrator accounts.

Login Properties - Options and Description

To access the login properties, right-click on **All users** in the structure window and click on **[Login properties]**.

Login Options

- Password expiration (days)
  After this time, the user has to define a new password.
- Warn about password expiration (days)
  Defines a reminder before expiration. In days before expiration takes place.
- Allowed login attempts
  Defines how many login attempts with an incorrect password are permitted until the user will be locked.

Logout options

- Automatic logout
  If the automatic logoff is activated, the user will automatically be logged off after the pre-defined time without any user interaction.
- Automatic logout timeout (minutes)
  Time in minutes until an automatic logoff takes place.

Password complexity

- Password minimum length
  A minimum password length can be defined here.
- Prevent reuse of recent passwords
  The number of recent passwords that are not permitted.
- Use numbers and letters
  If activated, the password must contain numbers and letters.
- Use upper and lower case letters
  If activated, the password must contain upper and lower case letters.

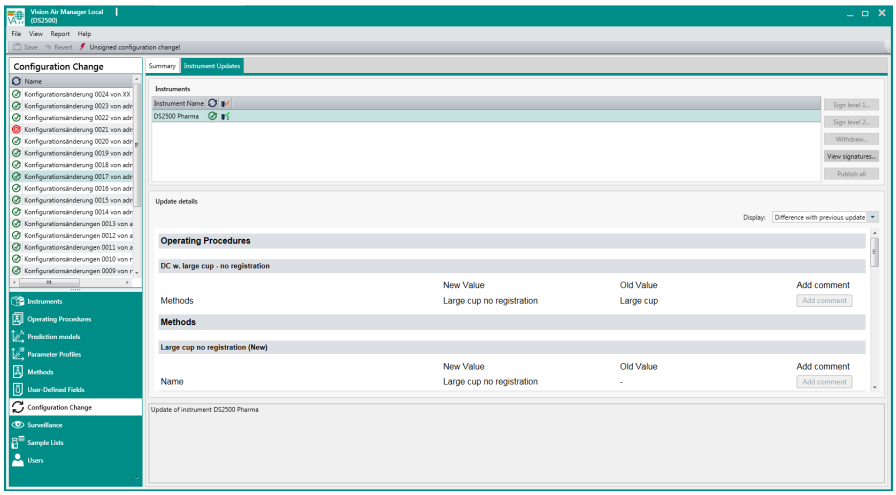
Enable/Disable User Management (non-pharma)

If you do not want a permanent check during start-up of Vision Air Routine or Vision Air Manager, User Login can be set to automatic mode.

Go to **View** ▶ **Security Options**. Activate **Enable automatic login**.

3.1.11 Configuration change section

The **Configuration Change** section lists all existing configuration changes. In order to apply changes to clients a configuration change needs to be published.



In a configuration change all changes, e.g. a parameter within an operating procedure, are listed and can be compared with an earlier state of the configuration.

Symbol	Description
	Pending
	Published
	In progress
	Cancelled
	Failed
	Completed

The **Configuration Change** section contains the following work window tabs:

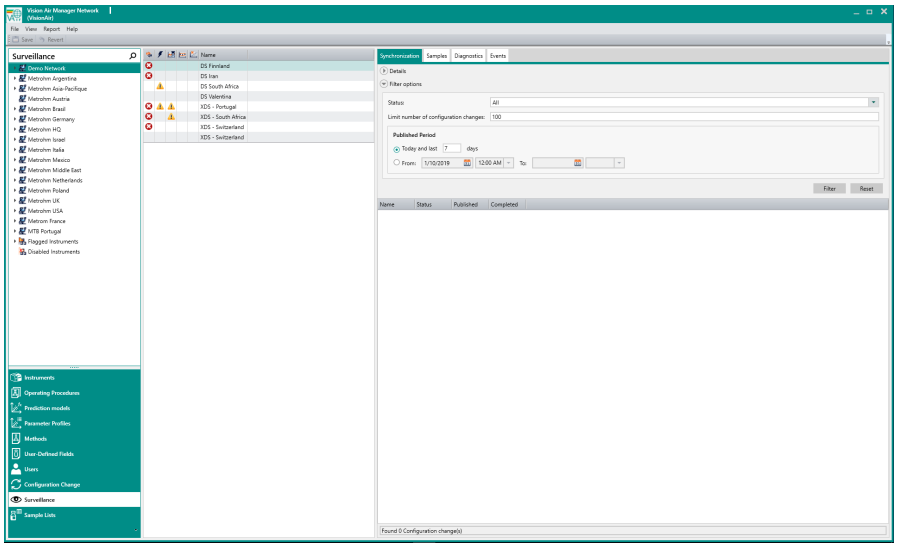
Summary

Information about the selected configuration change is displayed.

Instrument Updates

In this tab the content of the configurations changes is displayed.

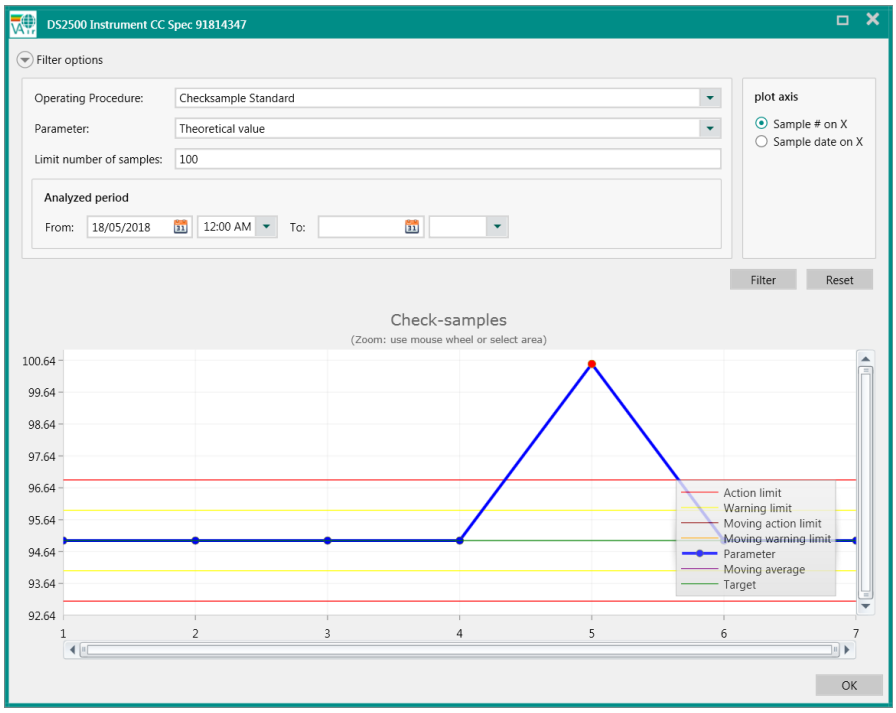
3.1.12 Surveillance section



The **Surveillance** section lists all samples, diagnostic tests and events.

By right-clicking in the structure window, the user can set the following options.

- Clear flags
  Flags (error / warning) that are displayed for an instrument in the structure window can be cleared. The user can enter a **Reason for clearing the flags** in the pop-up window.
  The **Flags log** report shows the history 1 month back in time, including information on who cleared specific flags and the reason for doing it.
  Depending on the situation, status symbols can be shown in the events (), diagnostics (), operating procedure limits () and outlier () columns.
- Show shewhart chart
  The shewhart chart is a control chart that is used as a tool to supervise the analysis of check samples.



Enable/Disable surveillance

It is possible to disable the surveillance of an instrument. After disabling, the instrument is not flagged anymore, for example after a failed instrument diagnostic test. This function can be used when there is a known problem with an instrument and there is no need for surveillance prior to corrective maintenance. To do this, right-click on the instrument in the structure window and select **Disable surveillance**.

The **Surveillance** tab contains the following work window tabs:

Samples

In the **Samples** tab, the user is given an overview over all the measured samples within the set filter settings.

Depending on the situation, status symbols can be shown in the raw data (), reference data (), events (), outlier () and operating procedure limit () columns. These symbols are summarized in the **Status symbols** section.

Samples for which outlier limits and/or operating procedure limits are exceeded are colored yellow (warning limits) or red (intervention limits).

Filtering is not case-sensitive, e.g. 'A' and 'a' are treated equally.

Always click on **[Save]** after changing a sample number and before initiating a new filter search.

By activating the check box **Show sample information:**, extra information such as method used and user-defined fields input are immediately

displayed in the sample list. By activating the check box **Show secondary parameters:**, parameters such as distance for identification and qualification predictions are displayed in the list.

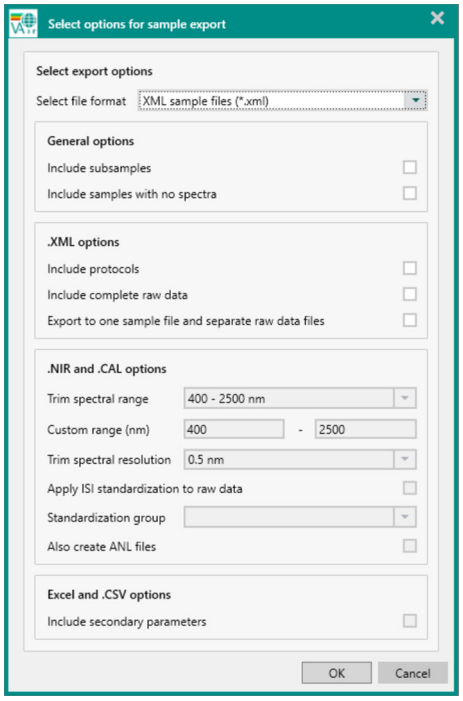
By clicking **[Edit]** in the **Advanced filters** area, up to 5 different advanced filters can be added.

With the **[Match]** option in the advanced filter area, you can define that samples must match all the defined filters or any of them. The **[Reset]** button resets all the filter settings.

When advanced filters are active, this is displayed in the main view.

Export

The data of (a) highlighted sample(s) can be exported by clicking on **[Export...]**. In the **Samples export options** window, the user can change the following default export options:

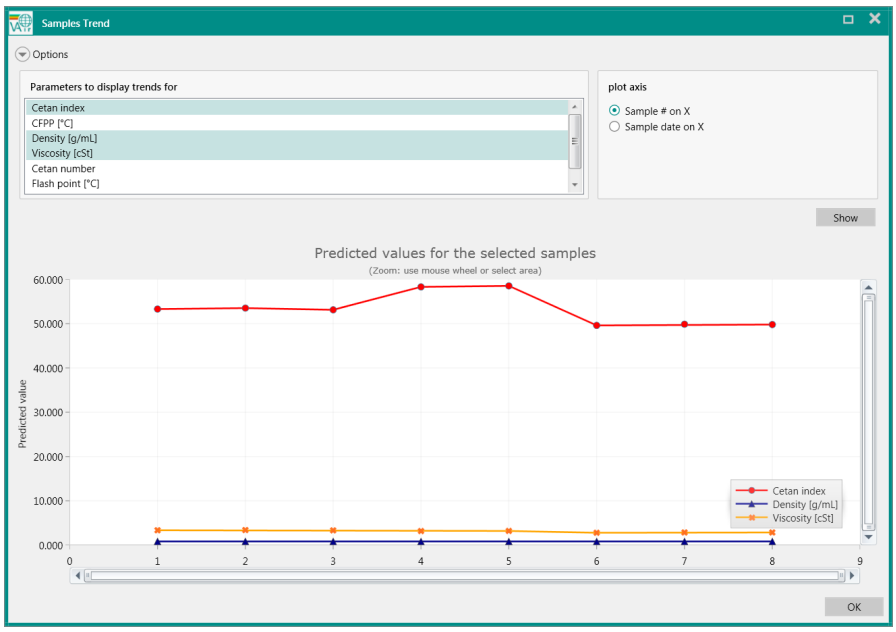


In the **Select file format** drop-down menu, the formats .xml, .xlsx, .csv, .nir and .cal can be selected.

Samples that are exported to .xml can be used for prediction model development in Vision, The Unscrambler and PLS_Toolbox. The additional settings under **.xml options** are only available when choosing .xml export. The **Include protocols** option exports additional information, such as the kind of analyzer or sample vessel that was used for the analysis.

Samples trend

By right-clicking on a selected sample, a context menu (samples graph) is available that allows to plot the predicted quantitative results in a trend chart. Contrary to Vision Air Routine, more than 2 quantitative parameters can be displayed in parallel.



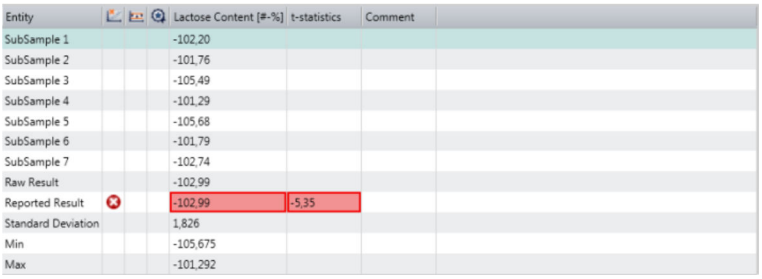
It is possible to view more than 1 sample in the Samples trend window. To do this, press the **[CTRL]** key and select a number of samples in the sample list. Then click on the **[Samples trend...]** button.

Sample details

By double-clicking on a sample in the sample list, the **Sample details** window appears. Alternatively, the **Sample details** window is accessible by right-clicking on the sample and selecting **[Details]**. The upper section of the window shows general information and sample information values.

The **Sample details** window contains the following tabs.

- **Predicted values**
  This tab lists the predicted values of the sample including subsamples, if relevant. The list indicates the quality ( ) of the sample and if the sample is an outlier ( ) and/or outside operating procedure limits ( ). Results for secondary parameters are also listed in this view.



Entity	Lactose Content [#-%]	t-statistics	Comment
SubSample 1	-102,20		
SubSample 2	-101,76		
SubSample 3	-105,49		
SubSample 4	-101,29		
SubSample 5	-105,68		
SubSample 6	-101,79		
SubSample 7	-102,74		
Raw Result	-102,99		
Reported Result	-102,99	-5,35	
Standard Deviation	1,826		
Min	-105,675		
Max	-101,292		

  The result in the **Raw result** row is the predicted value of the mean spectrum (depending on the type of instrument and settings) before post-processing i.e. Moisture compensation and Slope/intercept.
  The **Reported result** is the main result that is also displayed on the **Result** display in Vision Air Routine.
- **Sample events**
  Sample events displays all events that are related to the sample, e.g. when quantitative results exceed the set limits.
- **Reference values**
  By clicking on the **Reference values** tab and double-clicking in the **Reference value** column, reference values can be edited.
  An edited reference value is shown in a **Sample detail report**. It is also included in sample exports and available when calculating slope and intercept.
- **Sample data**
  The **Sample data** tab shows the spectrum of the samples.
- **Instrument protocol**
  The **Instrument protocol** tab displays the sample vessel used, hardware specific information and information concerning the software version.
- **Parameter protocol**
  The **Parameter protocol** tab displays the prediction model used and slope and intercept values for the individual prediction models.
- **Operating procedure limits audit trail**
  The **Operating procedure limits audit trail** tab displays the set limits and targets for the quantitative prediction models that were used for the measurement.

Diagnostics

In the **Diagnostics** tab, an overview over all diagnostic tests within the set filter settings is displayed.

By double-clicking on a diagnostic test, the **Test details** window appears. Alternatively, the **Test details** window is accessible by right-clicking on

the diagnostic test and selecting **Details**. The upper section of the window shows general information and steps that are conducted during the test.

The diagnostic test contains the following steps:

1. Lamp test
   Tests whether the voltage is ok and the lamp uses the expected current.
2. Grating test
   Tests whether the grating moves smooth and with the correct speed.
3. Detector 1
   Tests the functionalities of the individual detectors of the spectrograph.
4. Main hardware test
   Checks whether a sample holder is present and which type of sample holder it is. Measures the temperature of the sample holder and estimates the sample temperature.
5. Stability test
   Tests whether the system is running stable. The noise value of the spectrometer is used for the stability test.
6. Wavelength test
   Tests whether the wavelength axis is within the allowed tolerances.

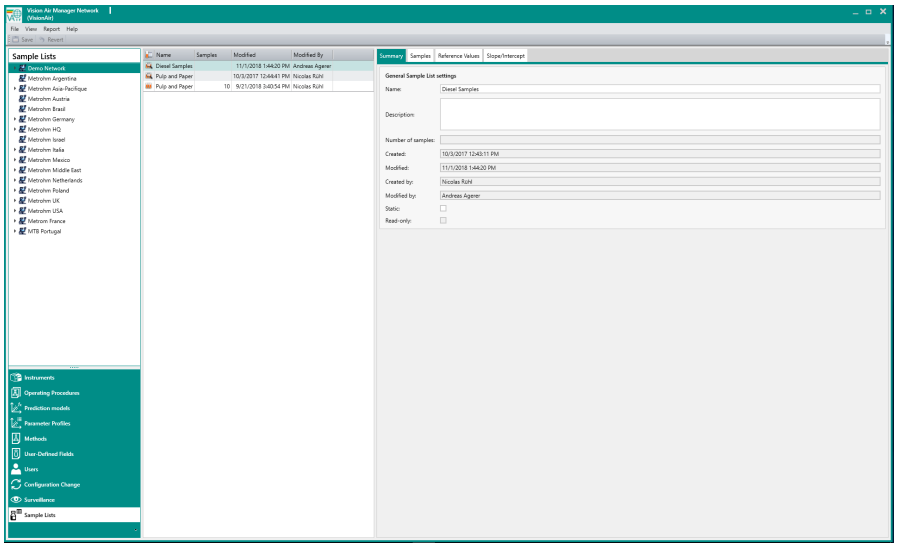
By selecting a step and going to the **Data** tab, the collected data is shown respectively. Not all steps include data. Some tests, e.g. wavelength tests, show absorbance spectra and tables with respective acceptance values. Acceptance values are displayed when hovering over the individual columns of the table.

Events

In the **Events** tab, an overview over all events within the set filter settings is displayed. There are 3 kinds of events.

- Instrument specific
  E.g. instrument diagnostic test canceled.
- User specific
  E.g. user logged into Vision Air Manager.
- Software specific
  E.g. new instrument configuration is created.

3.1.13 Sample lists section



The **Sample lists** section allows managing large data sets by using dynamic sample lists and static sample lists. Updates of quantitative prediction models are conducted with slope corrections and intercept corrections by using dynamic sample lists and static sample lists.

By right-clicking on the structure window, a new sample list group can be defined. The new sample list group is used as a folder for dynamic sample lists and static sample lists. A new sample list is dynamic by default. A new sample list is created within this sample list group by right-clicking on the folder.

Summary

- Name of the sample list.
- Information on when the sample list has been created and modified. If no modification has been conducted, the time stamp for modification and creation are identical.
- By activating the **Static** check box, the sample list is modified to a static sample list. A static sample list cannot be reverted to a dynamic sample list. The sample lists that match the filter settings are fixed. Afterwards, the filter settings are not available anymore for this static sample list.

Samples

Surveillance view with different filter settings. The set filter settings are stored within the sample list. The results are updated automatically. For static sample lists, only the previously defined spectra are displayed.

Reference values

Displays entered reference values with respect to samples that match the filter settings defined in the samples work window tab. Missing reference

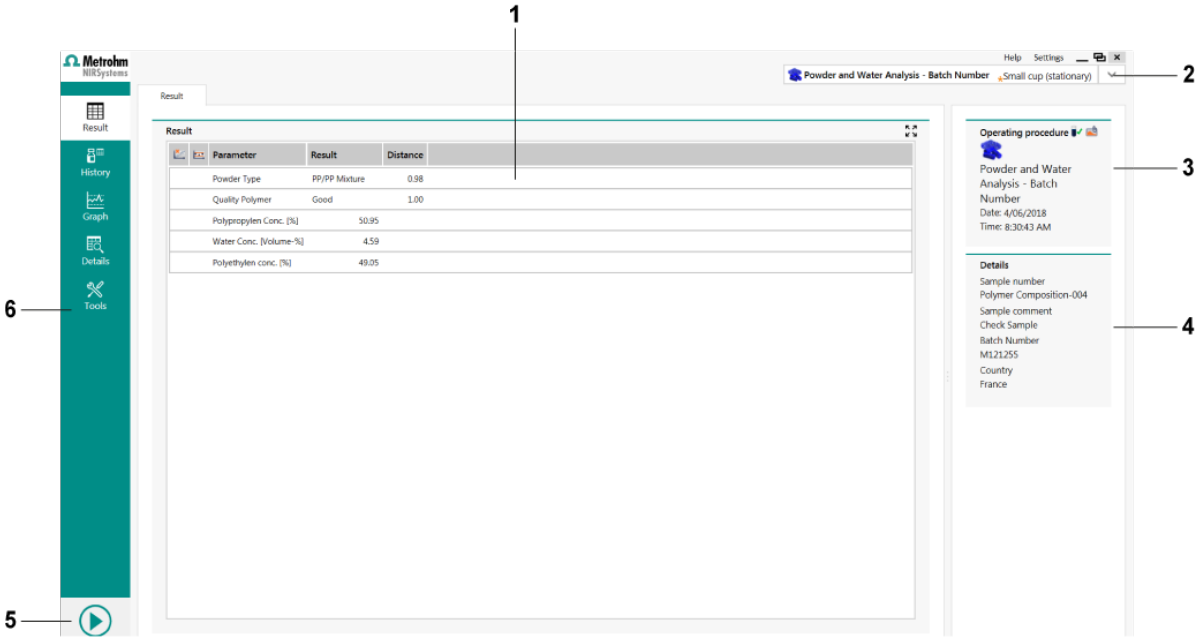
values can be added within this window. When users try to enter a reference value for a sample that was not measured with the respective parameter profile, reference values are not stored after clicking on the **[Save]** button.

Slope/intercept

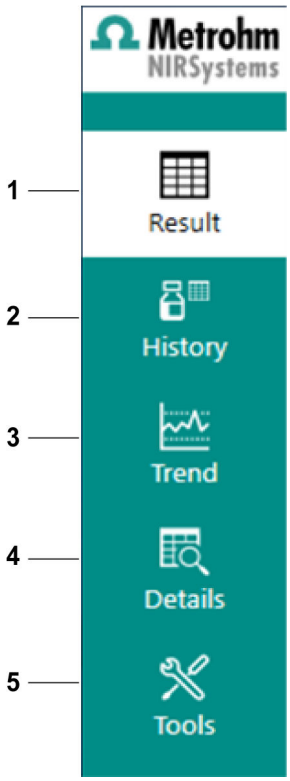
Adjustment of quantitative prediction models by using a slope correction and intercept correction *(see "Slope/intercept calculations", chapter 3.3.8, page 75)*.

3.2 Vision Air Routine

3.2.1 User interface



1	**Data window**	**2**	**List of operating procedures**
3	**Information field** Operating procedure name and time when the sample was measured.	**4**	**Sample registration details field** Additional information that was entered during sample registration.
5	**Start button**	**6**	**Navigation window** Options that enable the user to navigate through Vision Air Routine.



1 Result
Displays the most recently calculated result with respect to the selected operating procedure.

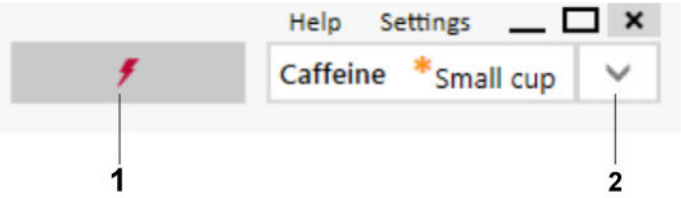
2 History
Displays all the collected results with respect to the selected operating procedure.

3 Trend
Graphical display of results over time with respect to the selected operating procedure.

4 Details
Extended sample information, e.g. spectra display.

5 Tools
Section for report creation, instrument tests and general settings.

System Events



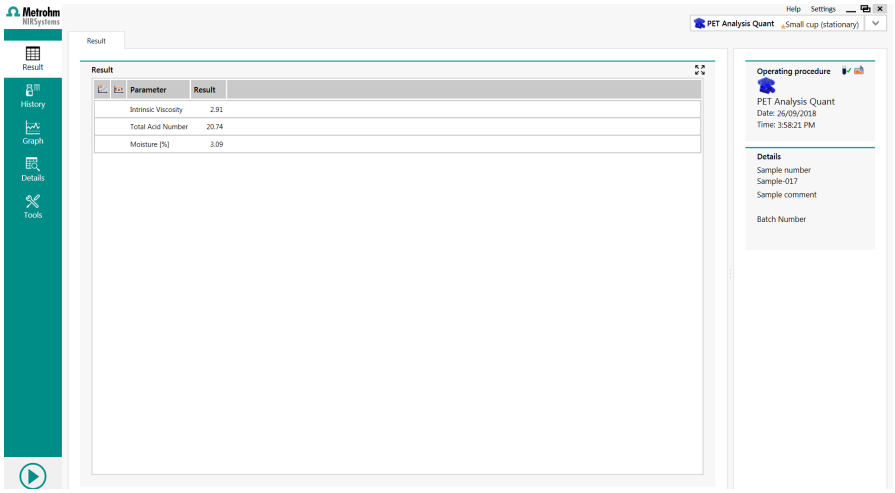
1 System event indicator

The system event indicator flashes yellow ( ) when 1 or more system warnings in the list are waiting for a user action. If the list also contains errors, the system event indicator flashes red ( ) and the **[Start]** button becomes inactive.

To open the system events list, click on the system event indicator (/) in the top right corner of the screen.

2 List of operating procedures

3.2.2 Results section



Result tab

In the **Result** section, the result that was selected in the history view is displayed. Normally, this is the sample that was analyzed last. This view includes column headers that show the name of primary and possibly secondary parameters of the selected operating procedure.

The header is divided into the following column fields. See next section for a description.

Sample event icons

- Outlier status ( ) indicates if a given parameter is outside of the outlier limits: If a sample was identified as an outlier, a warning ( ) or error ( ) icon is shown.
- Operating procedure limit status ( ) indicates if the predicted value for a given parameter is outside of the limits: If a quantitative result is outside of the warning limit or intervention limit, a warning ( ) or error ( ) icon is shown respectively.

Results with warning markings or error markings are indicated by yellow and red background colors, respectively. If 1 of these markings is shown, the reason for this is displayed at the bottom of the result window.

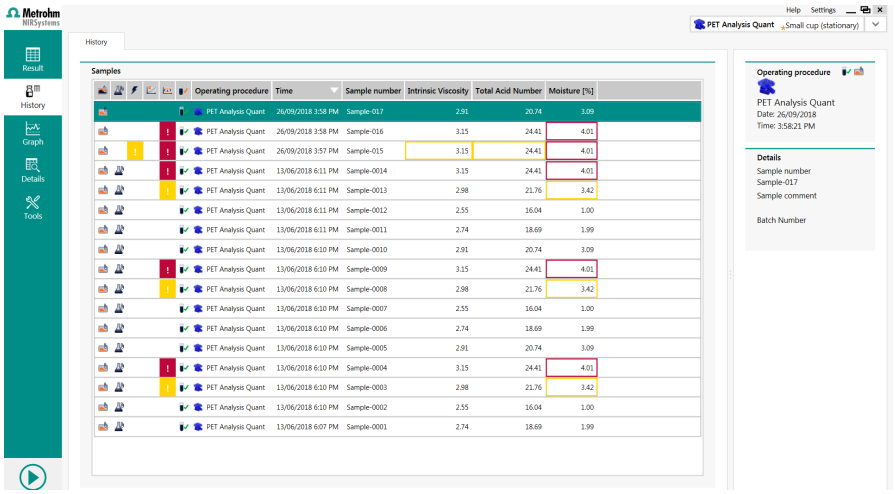
Result value

Primary parameter value (predicted value) is followed by possible secondary parameters (depending on prediction model settings). If a parameter cannot be predicted for some reason, the field contains a "-" (minus) sign.

In the case that the selected operating procedure contains an identification prediction model or qualification prediction model, a primary value is displayed as a text string, e.g. lactose or different mesh sizes. If enabled, secondary parameters are displayed, e.g. **Confidence** or **Max. distance**.

- Confidence ranges from 1 down to 0. Good confidence is close to 1.
- Max. distance shows the highest allowed normalized distance from unknown sample to best match sample group.

3.2.3 History section



History section

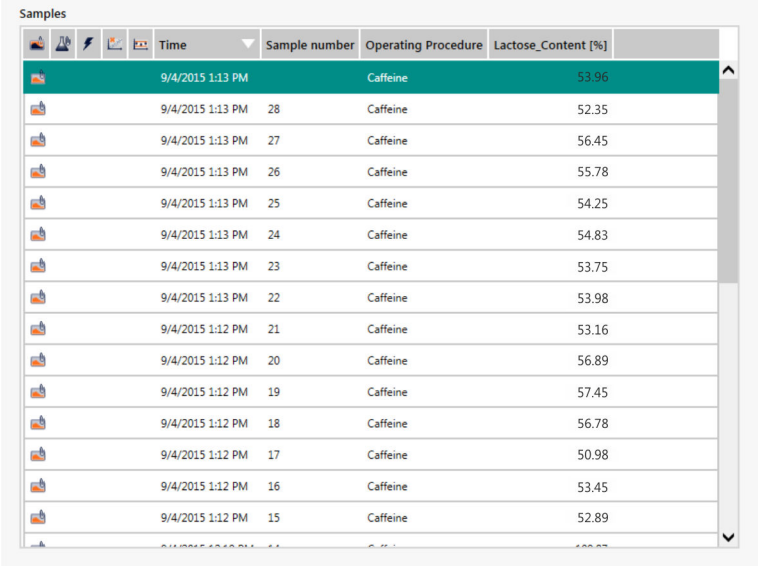
The **History** view shows a list of sample results that were measured with the selected operating procedure.

Sample event icons and further information in the data window:

- Raw data status: The type of icon indicates what kind of data has been stored to the database. When extra data is attached to the sample result, a data type icon is displayed in the left column: Sensor and pre-processed data (), Pre-processed data (, default data type).
- Reference data status (): When a reference value has been added to a sample, a reference icon is displayed.
- Sample events status (): A warning () or error () icon is displayed for hardware specific issues, e.g. if the lid of the DS2500 instrument was open during measurement.
- Outlier status (): A warning () or error () icon is displayed if a sample has been identified as an outlier.
- Operating procedure limits status (): A warning () or error () icon is displayed if a quantitative result has been identified to be outside of the warning limit or intervention limit.
- Operating procedure: Sample number of the operating procedure.
- Time: Indicates at which time the sample was analyzed.
- Sample number: User-defined or automatically generated sample number.
- Parameter name: Parameter names, e.g. "Water content", are mentioned in the order that has been set for that operating procedure.

Reference data

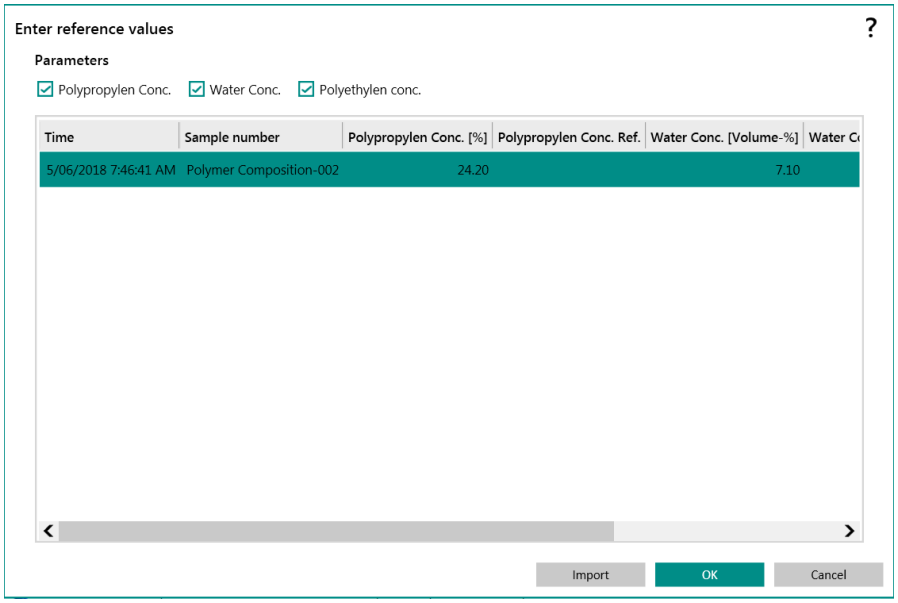
It is possible to add reference values to predicted parameter values.



First, select the samples for which reference data should be added. A sample is selected by clicking on the row. Multiple samples can be added by pressing the **[CTRL]** key simultaneously. Right-click to open the following dialog.

Click on a reference field to enter a reference value.

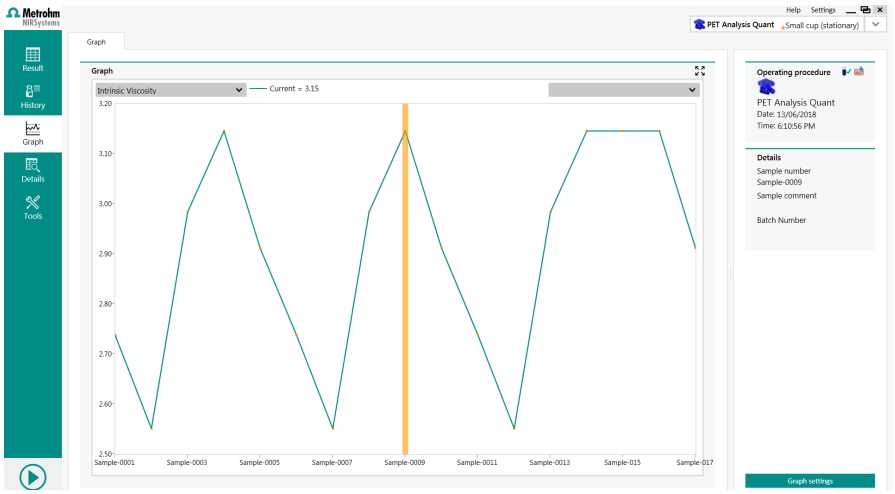
Alternatively, reference values can be imported with .csv files *(see "Importing reference values with a .csv file", chapter 3.3.3, page 67)*.



Exporting sample data

It is possible to export the selected sample data to a file in CSV, Excel, rich CSV, rich Excel, NIR or CAL format from this menu.

3.2.4 Trend section



The trend graph shows quantitative values for the selected parameters of the current operating procedure.

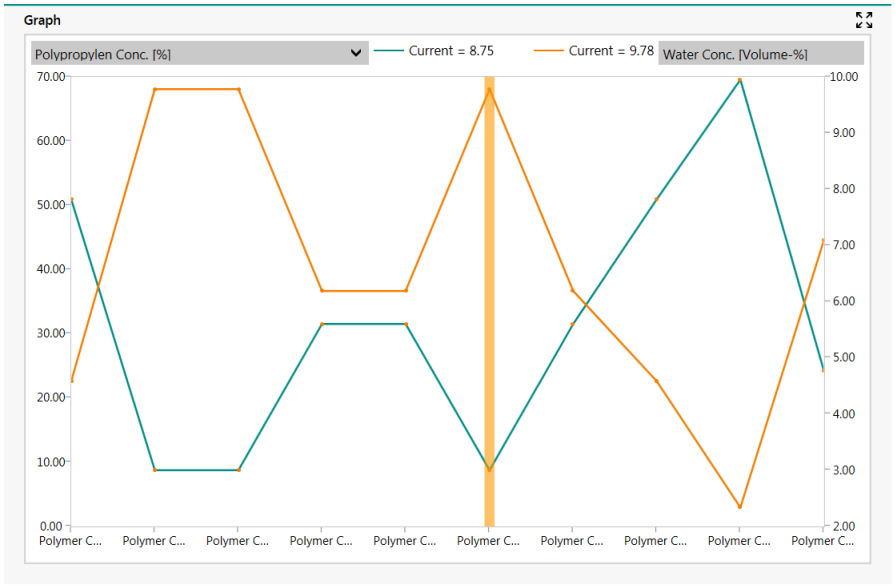
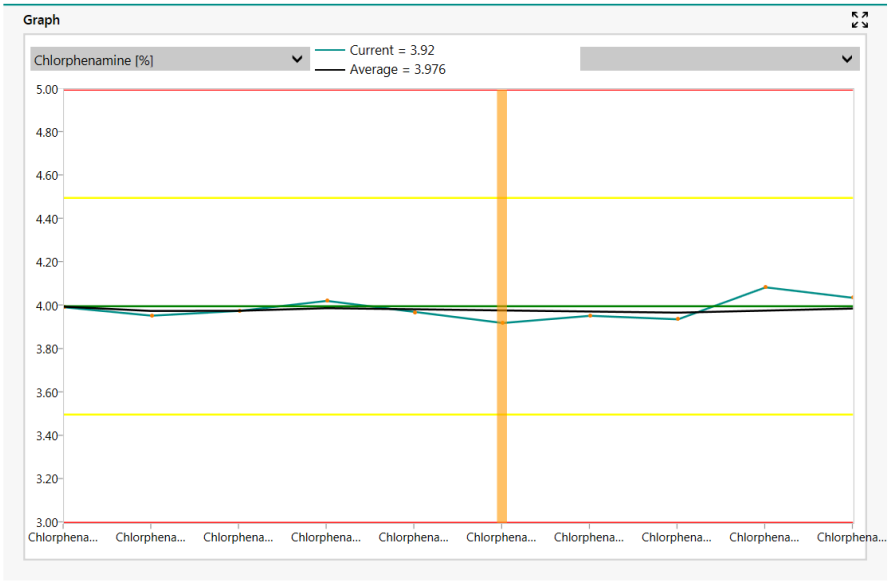


Figure 1 Main graph

The trend graph can show 1 or 2 parameter plots. Parameters are selected by using the “Green Plot” and “Orange Plot” drop-down lists on top of the graph. The lists contain all the parameters that were investigated with the currently selected operating procedure.

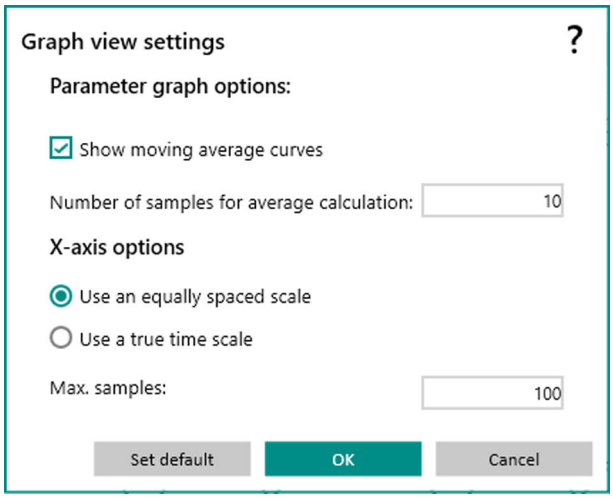
If only 1 graph is displayed, a graph for the running average can be displayed. If upper and lower warning limits, intervention limits and a target value have been defined in Vision Air Manager, they are also shown, so that up to 5 horizontal lines are displayed.



If a measured value is selected in the graph, a vertical orange line is displayed that highlights the selection. The upper middle part of the window shows the quantitative result(s) of the selected measurement.

Trend settings

The settings field contains the **[Trend settings]** button that gives access to the **Trend settings** dialog window.

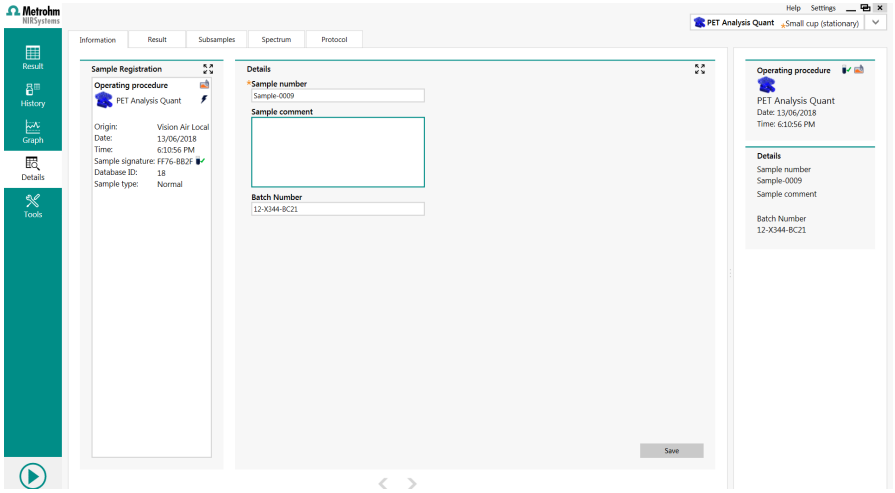


The following trend settings are available:

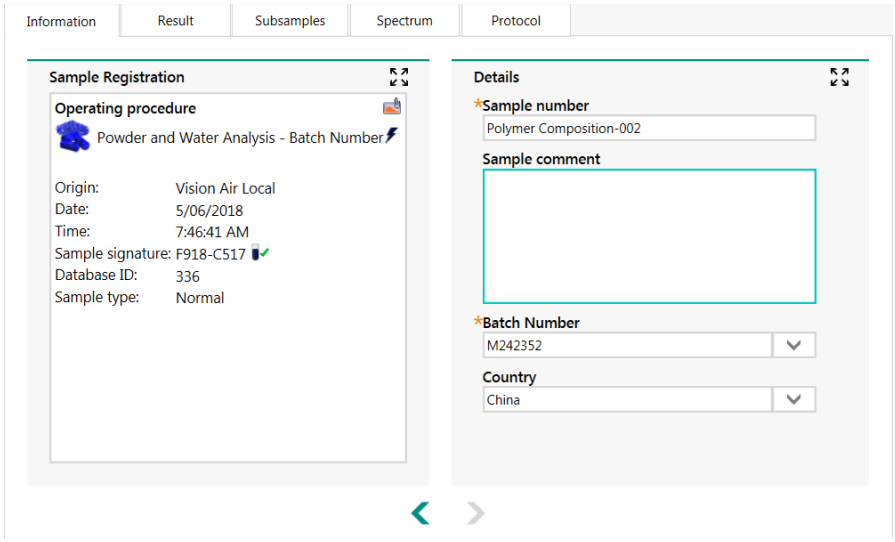
- Parameter graph options
  Show moving average curves: This defines if a moving average should be calculated and displayed as well as the number of recent samples to include in the calculation.
  Number of samples for average calculation: The running average calculation is based on the defined number of samples.

- X-axis options
  Use an equally spaced scale, i.e. the x-axis distance between samples must be equal.
  Use a true time scale, i.e. the x-axis distance between samples is proportional to the time between the measurements.
  Max. samples, i.e. the graph shows "max." sample results, from the most recent samples.
- Set default
  By clicking the **[Set default]** button, the last graphical settings are saved and used thereafter.

3.2.5 Details section



Information tab

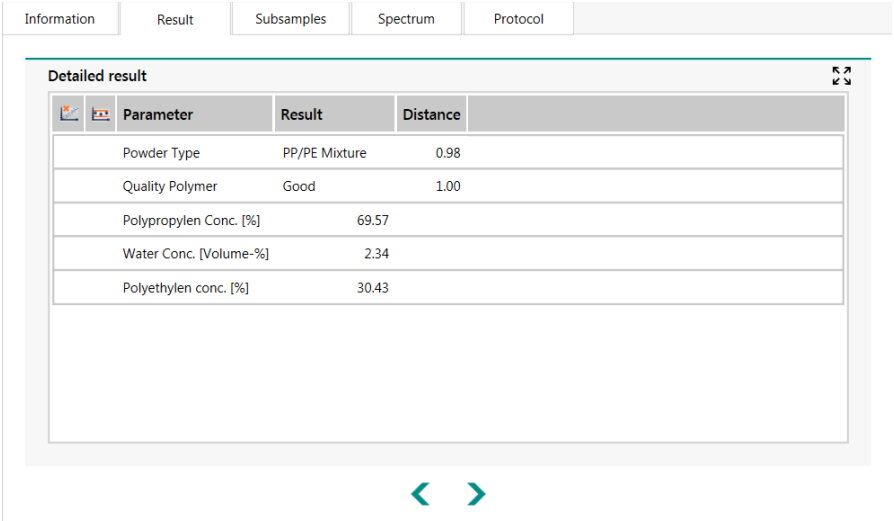


In the **Information** tab, extended information is available for a specific sample. It is also possible to edit or add additional information (depending on the operating procedure settings).

- Sample registration
  Fixed information of the selected sample.
  - Sample signature
    A signature/checksum for the sample that is created at the time of analysis.
  - Database ID
    An internal ID in the Vision Air database.
- Details
  Sample registration information that can be edited.

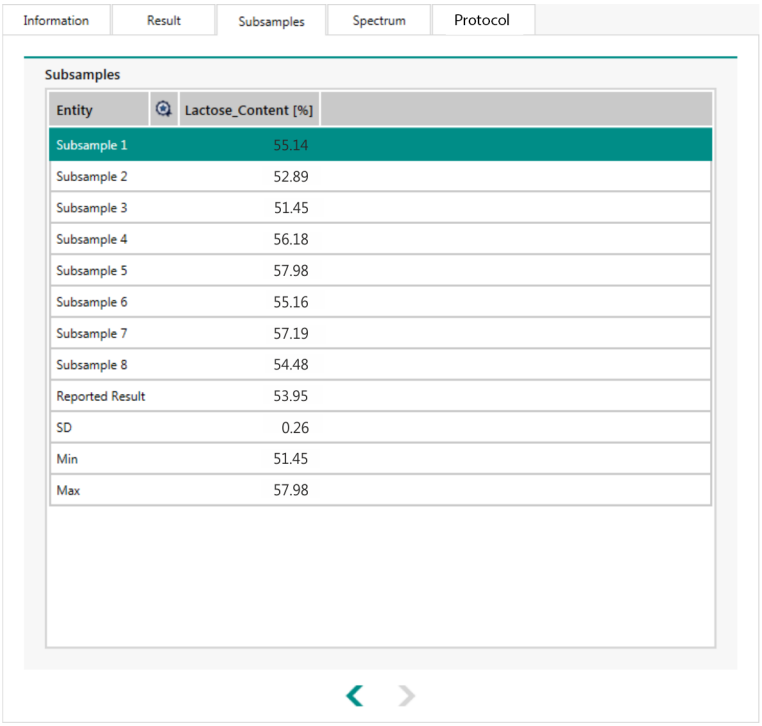
Click on the **[Save]** button after every change.

Result tab



The **Result** tab shows the same information as the **Result** view. This does not apply for measurements with subsamples or multiple cups where the standard deviation of the result is displayed.

Subsamples tab



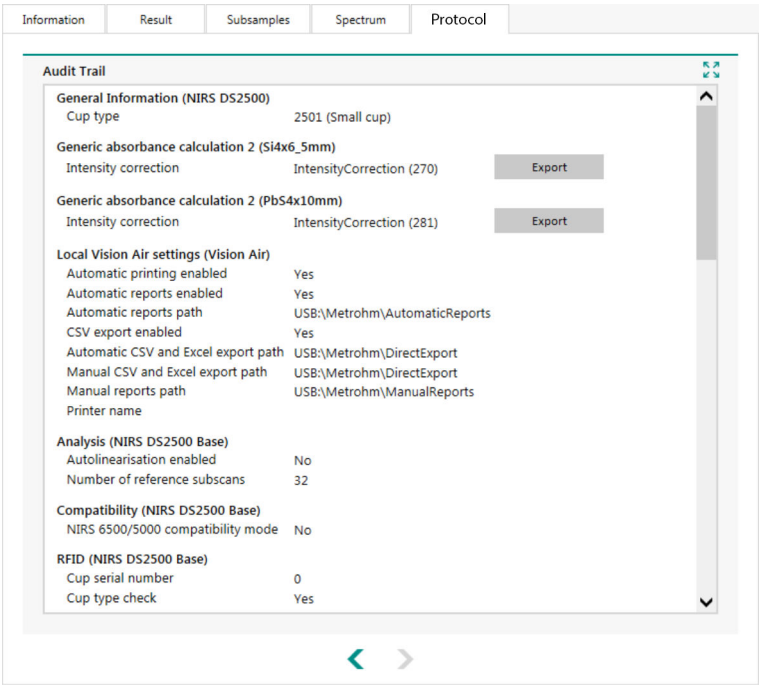
The **Subsamples** tab shows subsample results, the reported result, standard deviation of the results, min. values and max. values. Thus, it is possible to study whether some subsample results differ from others.

Spectrum tab

The **Spectrum** tab shows the absorbance spectra of the analyzed sample. The number of displayed subsamples depends on the settings.

Subsample storage needs to be activated in the storage option of the method. Additionally, the number of subsamples needs to be defined in the repetition setting of the method. Not all accessories allow the collection of subsamples.

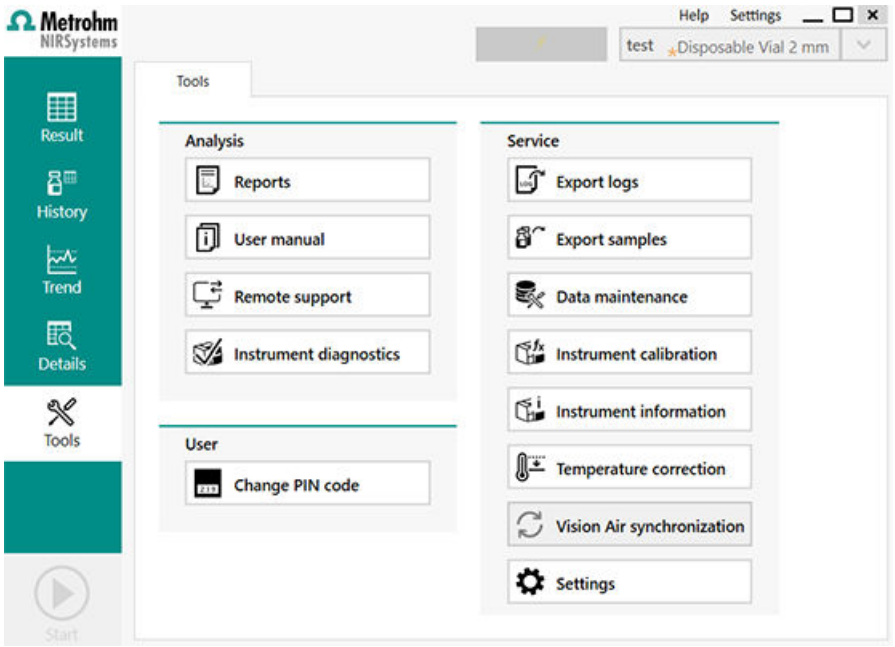
Protocol tab



The **Protocol** tab gives an overview of measurement settings for the analyzed sample.

Some settings are relevant to the instrument (or a specific part of the instrument) while other settings are related to parameters. The relevant instrument part name or parameter name is shown in brackets.

3.2.6 Tools section



The following functions are accessible in the **Tools** section.

- Reports
  Predefined reports are accessible by clicking on **[Reports]**. Predefined reports are available for example for sample details, instrument diagnostics or sample lists.
  A sample detail report displays a report for the selected measurement in the **History** view. If no selection is made, the report is created for the last conducted measurement.
  An instrument diagnostic report displays the results of the last instrument diagnostic.
  Additional reports can be added in Vision Air Manager *(see "Reports and report management", chapter 3.3.2, page 64)*.
- User manual
  The **[User manual]** button opens the manual for the currently connected instrument.
- Remote support
  The **[Remote support]** button allows you to initiate a remote support session via TeamViewer.
- Instrument diagnostics
  The **[Instrument diagnostics]** button initiates the instrument diagnostic test, which verifies the hardware performance of the analyzer.
- Change PIN code
  The **[Change PIN code]** button allows you to change the PIN code. PIN codes are used when creating a manual backup, restoring a backup, creating a check sample operating procedure or performing a photometric test definition.

- Low flux noise test (external standard) (only available for XDS instruments and DS2500 Solid Analyzer)
  The **[Low flux noise test (external standard)]** button starts a low flux test. For the low flux test, an external optical density filter is used to measure the instrument performance at lower light intensities.
- Wavelength certification (only available for XDS instruments and DS2500 Solid Analyzer)
  The **[Wavelength certification]** button starts a wavelength test. For the wavelength test, an external wavelength standard is used to measure the accuracy and precision of the analyzer with respect to the wavelength axis.
- Photometric test (only available for XDS instruments and DS2500 Solid Analyzer)
  The **[Photometric test]** button starts a photometric test. For the photometric test, an external optical density filter is used to measure the linearity of the instrument within a defined absorbance range. Before starting a photometric test, a photometric test definition needs to be executed.
- Export logs
  The **[Export logs]** button allows you to export log files for trouble shooting purposes.
- Export samples
  The **[Export samples]** button allows you to export collected measurements. A folder with an .xml file is created in the selected destination.
- Data maintenance
  The **[Data maintenance]** button allows you to start a backup of the database, to restore an existing database or to delete samples for a defined time period.
- Instrument calibration (only available for DS2500 instruments)
  The **[Instrument calibration]** button starts instrument calibration with the internal wavelength filter or with the external wavelength filter.
- Instrument information
  The **[Instrument information]** button opens the **Instrument information** window. The **Instrument information** window displays information on the Vision Air version used, the analyzer name that is defined in Vision Air Manager and some computer specific information, for example the IP address.
- Temperature correction (only available for DS2500 Liquid Analyzer)
  The **[Temperature correction]** button allows to correct the temperature difference between the sample holder and the sample.
- Vision Air synchronization
  The **[Vision Air synchronization]** button allows to manually synchronize results that were collected in Vision Air Routine with Vision Air Manager Network *(see "Synchronize with Vision Air Server", page 127)*.

- Settings
  The **[Settings]** button grants access to different settings.
  - Vision Air sync
    In the **Vision Air sync** section, the user can define a connection to a Vision Air Manager Network system.
  - Import
    In the **Import** section, the user can import configuration files or directly access Vision Air Manager.
  - Export
    In the **Export** section, the user can define the storage locations for reports and results and allow an automatic export set in Vision Air Manager.
  - Print
    In the **Print** section, automatic print can be activated. Automatic print is set in Vision Air Manager. Additionally, the print template and the printer itself can be selected.
  - Protocol
    In the **Protocol** section, the user can select a storage location for information that is displayed in the **Protocol** section, in the **Details** section of Vision Air Routine.
  - Backup
    In the **Backup** section, the user can set an automatic backup plan and define the storage location.
  - Instrument
    In the **Instrument** section, the user can modify a global counter that can be used during automatic sample numbering.
- Photometric test definition (only available for XDS instruments and DS2500 Solid Analyzer)
  The **[Photometric test definition]** button allows you to define reference values for the photometric test by using external standards.

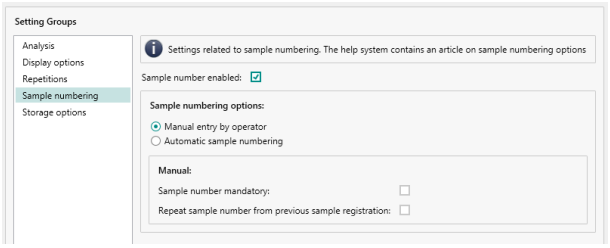
3.3 Specific functions in Vision Air

3.3.1 Sample numbering

The sample numbering is used during the sample registration step. The sample number defines the sample name.

Sample numbering options are specific for each method. It is possible to define mode-specific options, if sample numbering is enabled and what numbering mode (manual or automatic) is used.

Manual sample numbering



If the manual sample numbering option is selected, the user is asked to enter the sample number during measurement in Vision Air Routine.

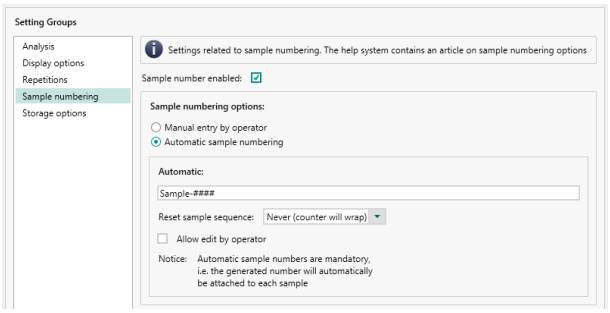
There are 2 options for manual sample numbering:

- **Sample number mandatory**
  If a sample number is marked as mandatory, it is not possible to complete measurement without entering data in the sample number field.
- **Repeat sample number from previous sample registration**
  This can be selected if a sample number is rather long, contains a lot of information and only a small part of it is changed for the next sample. If the user wants the sample number to be transferred from the previous sample registration, the corresponding setting must be selected.

Transfer rules:

- A pop-up window with the sample number appears during measurement even if transfer is activated. The user may edit the sample number or just leave it as is.
- The sample number is transferred from the previous sample registration, even after restarting Vision Air Routine.
- If measurement was canceled from the registration form, the sample number is not used for the next transfer, even if it was already entered.
- Transfer is started on the second sample after the corresponding setting has been selected.
- If the sample number was changed manually for any previous sample, the new value is used for the transfer.

Automatic sample numbering



If the automatic sample numbering option is selected, the sample number is generated automatically during measurement using the defined mask. The mask should be entered into the text field and may contain the following formatting codes, which are substituted by real data:

- [INSTRUMENTNAME] – name of the current instrument
- [PRODUCTNAME] – name of the current operating procedure
- [PRODUCTCODE] – code of the current operating procedure (numeric value)
- [HH] – hours in 24 hour format
- [HHHH] – hours in 12 hour format (AM/PM)
- [MM] – minutes
- [SS] – seconds
- [YY] – year (13)
- [YYYY] – year (2013)
- [Y] – year (3) #-###### – consecutive sample counter. Number can have 1(#) to 6 (######) digits. Number starts with 0...01 and increments on every measurement.

Truncation:

It is possible to truncate strings in [PRODUCTNAME], [PRODUCTCODE] and [INSTRUMENTNAME] by appending the %n sign, e.g. [INSTRUMENTNAME %3]. If the string is longer than the defined number, it is truncated to the corresponding length (3 in the example) otherwise it is padded with spaces.

Example:

"[PRODUCTNAME%10] Sample-### [HH]:[MM]"

Mask creation rules

- All formatting codes, except number sequence, must be written in square brackets [ ].
- All formatting codes must be upper case.
- It is allowed to have only 1 number sequence (###) in the mask.
- It is allowed to not have any number sequence in the mask at all.
- If the formatting code was misspelled, it is not substituted by any value during sample number generation, and it is just left as is.

General sample numbering rules

- A sample number is generated on every measurement using the defined mask. The registration form is not shown to the user if only the sample number is required. If user-defined fields or sample comments should also be entered, the registration form is shown with the sample number already entered.
- The number in sequence (###) is incremented on every subsequent measurement.

- An automatically generated sample number can be changed by the user if the **Allow edit** setting is selected in Vision Air Manager.
- Automatic sample numbering is always mandatory; so it is not allowed to change it to an empty string.
- If the mask was changed in Vision Air Manager, the number generation starts from the initial number (the number sequence is reset to 0...01).
- When the maximum number is reached e.g. 99 for a ## mask, the initial number is applied on the next measurement (01).
- If the sample number was changed manually by the user, then it is checked during the next measurement if the entered number matches the mask. If yes, the entered number is used as a base when generating the subsequent number, e.g. with the following number sequence: 001, 002, 003, when 003 is changed to 123, the next sample number is 124.
  If the entered sample number does not match the mask, the previous valid number is used when generating the next number. Another example, with the following number sequence: 001, 002, 003, when 003 is changed to abc, the next sample number is 004.
- If the sample numbering mode is changed from manual to automatic, generation is started from the initial number even if the manually entered value matches the mask.
- The user can define when the sample numer sequence is reset: never, when a date changes, when a month changes or when a year changes. If the date/month/year changes, the number in the sequence is reset to the initial number.

3.3.2 Reports and report management

Reports can be created for Vision Air Routine and Vision Air Manager. Not all reports that are available in Vision Air Manager can be accessed in Vision Air Routine.

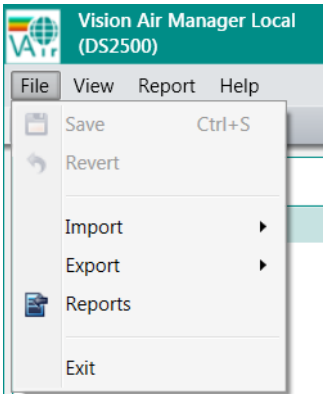
According to the current navigation window and current work window tab, the report menu shows different entries:

- Instrument detail
  This report is available when **Instruments** is selected in the navigation window.
- Prediction model list
  This report is available when **Prediction models** is selected in the navigation window.
- Prediction model list with details
  This report is available when **Prediction models** is selected in the navigation window.
- Instrument slope/intercept 30 days
  This report is available when **Surveillance** is selected in the navigation window.

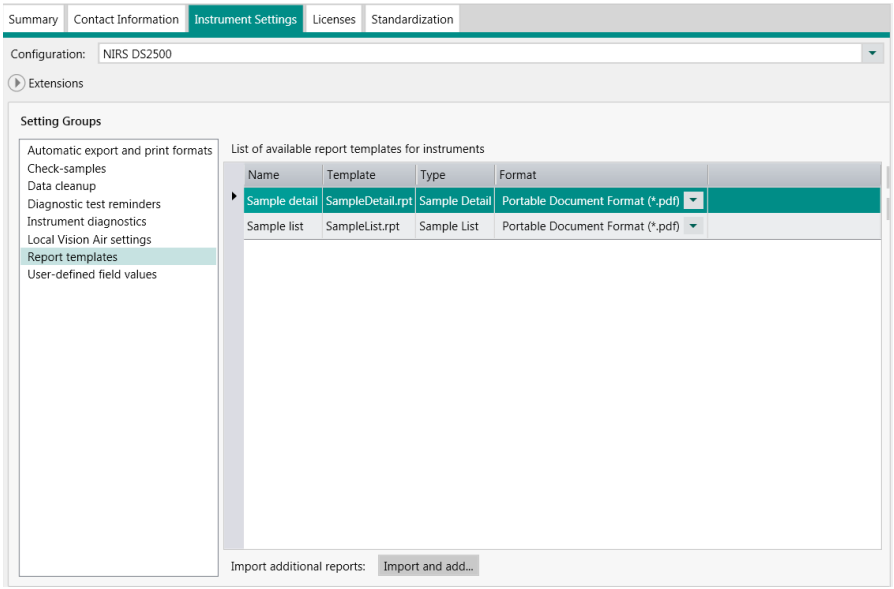
- Instrument status
  This report is available when **Surveillance** is selected in the navigation window.
- Flags log
  This report is available when **Surveillance** is selected in the navigation window.
- Instrument check samples 5 days
  This report is available when **Surveillance** is selected in the navigation window.
- Instrument group events 30 days
  This report is available when **Surveillance** is selected in the navigation window.
- Instrument group audit events 30 days
  This report is available when **Surveillance** is selected in the navigation window.
- Sample list
  This report is available when a sample is selected in the sample work window of the **Surveillance** navigation window.
- Sample list (landscape mode)
  This report is available when a sample is selected in the sample work window of the **Surveillance** navigation window. The report will be displayed in landscape format.
- Sample detail
  This report is available when **Surveillance** is selected in the navigation window.
- Simple single sample
  This report is available when a sample is selected in the sample work window of the **Surveillance** navigation window.
- Instrument diagnostics
  This report is available when **Surveillance** is selected in the navigation window and a self test is selected on the **Diagnostics** tab.
- Low flux test
  This report is available when **Surveillance** is selected in the navigation window and Low flux test is selected on the **Diagnostics** tab.
- Wavelength certification test (only available for XDS instruments and DS2500 Solid Analyzer)
  This report is available when **Surveillance** is selected in the navigation window and Wavelength certification test is selected on the **Diagnostics** tab.
- Instrument events - Selected period
  This report is available when **Surveillance** is selected in the navigation window and the work window events.

New report templates can be added with Vision Air Manager. Depending on the part of Vision Air (Routine or Manager), in which the report template should be available, different sections need to be used for the import.

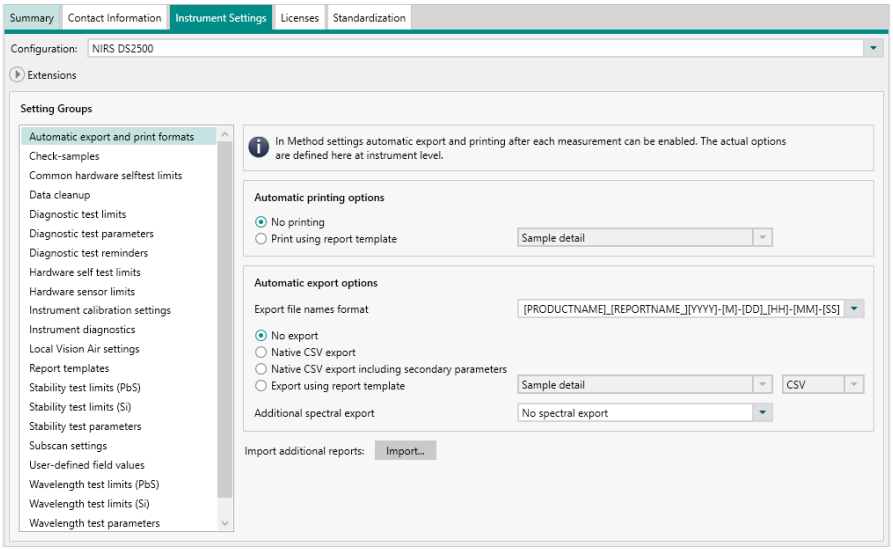
For Vision Air Manager, report templates are imported under **File ▶ Reports**.



For Vision Air Routine, report templates are imported under **Instruments ▶ Instrument settings ▶ Report templates**.



For automatic export in Vision Air Routine, report templates must be imported under **Instruments ▶ Instrument settings ▶ Automatic export and print formats**.



3.3.3 Importing reference values with a .csv file

Reference data can be imported from a .csv file that matches the structure of the displayed reference table.

	A	B	C	D
1	**Sample Number**	*Parametercode 1*	*Parametercode 2*	...
2	Sample name 1	10.1	0.5	...
3	Sample name 2	22.5	0.7	...
4	Sample name 3	40.3	1.1	...
5	Sample name 4	50.3	2.3	...

The list separator follows the PC's regional setting e.g. semicolon, comma, dot.

In the heading of the table, the sample number and the parameter code for reference values are defined.

The bold string **Sample number** is fixed and does not need to be modified.

For the strings **Parameter code x**, enter the appropriate parameter code that is defined in Vision Air Manager.

Sample names must be identical to the sample names that were used during sample registration. Sample names must not be listed in the same order as they were measured.

3.3.4 Check samples

This feature is only applicable for DS2500 instruments.

A check sample is a sample that can be used to quickly monitor the instrument's stability as an addition to the performance tests. Artificial and natural products can be suitable check samples. For natural check samples, it is recommended to use a sealable cup.

The target for the check sample, no matter if it is artificial or natural in origin, can be set by performing a check sample operating procedure in Vision Air. Any target value specified in Vision Air Manager takes precedence over a calculated target value from the check sample operating procedure. When the check sample is analyzed, the predicted result is compared against the target and the limits specified by Vision Air Manager.

If a check sample is used, it is recommended to analyze it at regular intervals as a routine operation. Note that the check sample operating procedure may be temperature-dependent and that care should be taken to use the definition in the standard operating environment, especially if natural check samples are used.

To create a sample operating procedure, proceed as follows:

1. Open Vision Air Manager.
2. Create an operating procedure. Set **Check sample** as the sample type.
3. Link the operating procedure with a quantitative prediction model and a method.
4. If you know the target value of your check sample, set it in the **Limits** tab.

   If you do not know the target value, you need to evaluate it. For evaluating the target value, follow the steps described in "Creating a check sample operating procedure" below.
5. Define the acceptance criteria. Define the calculation of lower and upper warning and intervention values in the **Limits** tab, in the **Type** drop-down list. If you want to evaluate the target value through a check sample operating procedure, select **Differential** or **Relative**.

To create a check sample operating procedure (target value), proceed as follows:

You need to define a check sample operating procedure if no target value has been set in Vision Air Manager.

1. Open Vision Air Routine.
2. Select an operating procedure with the sample type **Check sample**. These operating procedures display an additional check box in the operating procedure section.

Figure 2 Check sample

Figure 3 Check sample operating procedure

3 Set the check mark to run a definition in order to create your reference value for the following check sample analysis.

The default PIN code is 1234.

4 Place the check sample in the sample compartment.

5 Close the lid.

To analyze a check sample, proceed as follows:

1 Select the operating procedure for the check sample. Make sure that the check box **Check sample** is deactivated.

2 Position your check sample. Click on **[Start]**.

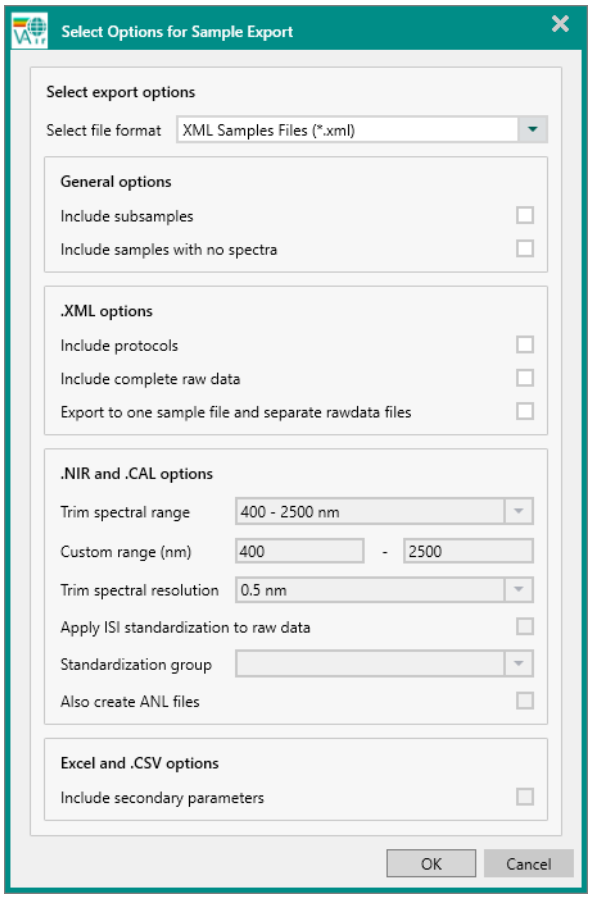
3 If the check sample passes, the lid opens and you can remove the check sample and run a check sample measurement. If the check sample test fails, follow the instructions on the screen and try again. If the problem persists, run an instrument diagnostic test and check if your check sample has changed. If the problem still persists, contact your local Metrohm representative.

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

3.3.5 Exporting samples for prediction model development

Measurements that were carried out in Vision Air Routine can be used to create and update prediction models that were created in Vision, The Unscrambler or PLS_Toolbox.

To export samples, go to the **Surveillance** section in the **Samples** tab and click on **[Export...]**. For the export, select the .xml file.



Check **Include protocols** to export additional information, e.g. which method has been used (optional). The advantage of including protocols for the export is that data collection methods are automatically created in Vision during a sample import.

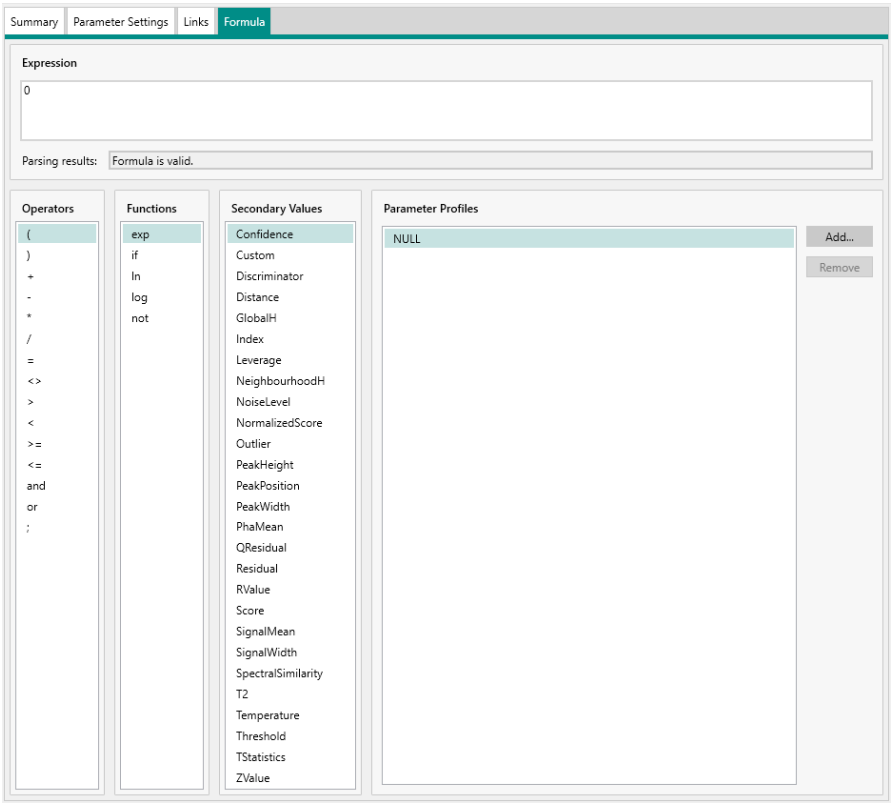
If you import the .xml file in Vision, the products in Vision are named according to the operating procedure used in Vision Air. If a product already exists in Vision, the user has to select whether the spectra has to be included in the product or a new product name has to be created.

3.3.6 Calculated prediction models

Calculated prediction models are defined formulas that allows you to postprocess results and to decide which result is presented to the user.

Creating a calculated prediction model

The **Create calculated prediction model** editor is used to create a formula. The editor can be accessed when creating a new calculated prediction model. To access the editor, right-click in the structure window of the **Prediction models section** and select **Create calculated prediction model**. A formula can be added in the **Prediction models** section on the **Formula** tab.



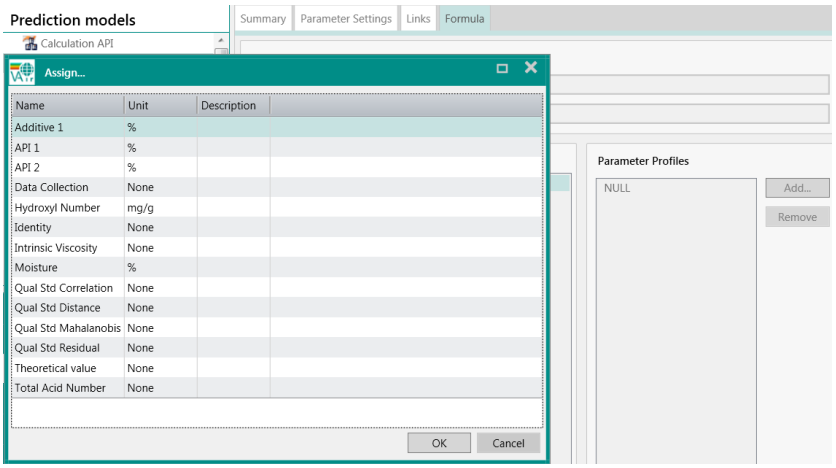
Adding a formula

It is important that the operating procedure for the calculated prediction model also contains prediction models that include the parameters referenced in the calculated prediction model formula. Otherwise, an error message is displayed at synchronization.

Example 1

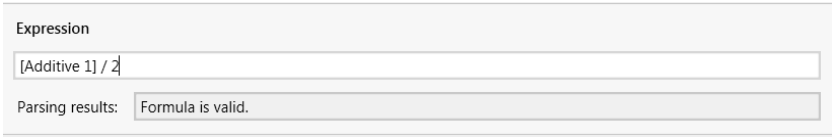
The example describes how to postprocess a predicted value of a prediction model.

1 Add the parameter profile of the prediction model that you want to postprocess by clicking on **[Add]** in the **Formula** tab.



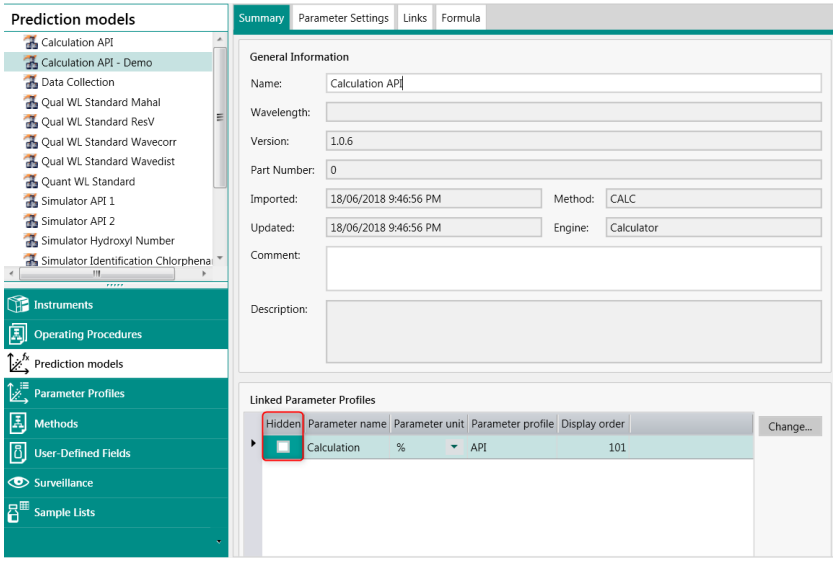
2 Remove the entries in the **Expression** field.

3 Enter the formula, e.g. if the result of a prediction should be divided by 2, double-click on the corresponding parameter profile, add the operator **/** and the number **2**.



4 Save the calculated prediction model. Add the calculated prediction model to the operating procedure that you want to use for postprocessing.

Make sure that the operating procedure includes the prediction model for which the postprocessing should be conducted. If the result of the prediction model should not be displayed, select the prediction model, go to the **Summary** tab and check **Hidden** in the **Linked parameter profiles** window.



Example 2

The example describes how to use calculated prediction models for automatic selection of the optimal prediction model and result display during routine analysis. This scenario is important, e.g. if a broad concentration range should be predicted. Typically, instead of using 1 prediction model for the whole concentration range, multiple prediction models are used. This increases the accuracy of the prediction. For this case, If-Then-Else-formulas are used.

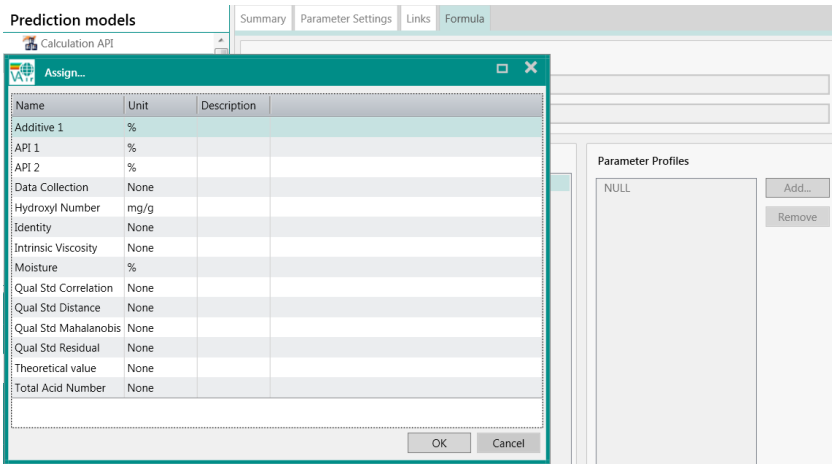
In the following example, a user has 3 prediction models.

- API Full
  Parameter profile for the prediction model that is predicting a concentration of API from 0 - 30%.
- API 1
  Parameter profile for the prediction model that is predicting a concentration of API from 0 - 10%.
- API 2
  Parameter profile for the prediction model that is predicting a concentration of API from 10.01 - 30%.

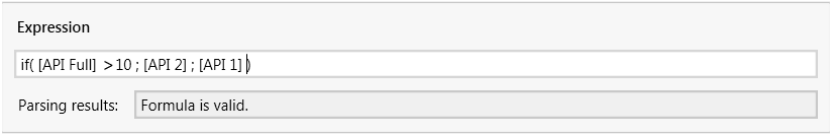
Only 1 result is displayed where the software chooses whether it displays the API 1 result or the API 2 result.

To start a prediction model, proceed as follows:

1 Add the parameter profile of the prediction model that you want to postprocess by clicking on **[Add]** in the **Formula** tab.



2 Enter the formula. The following screenshots show the syntax for the example.



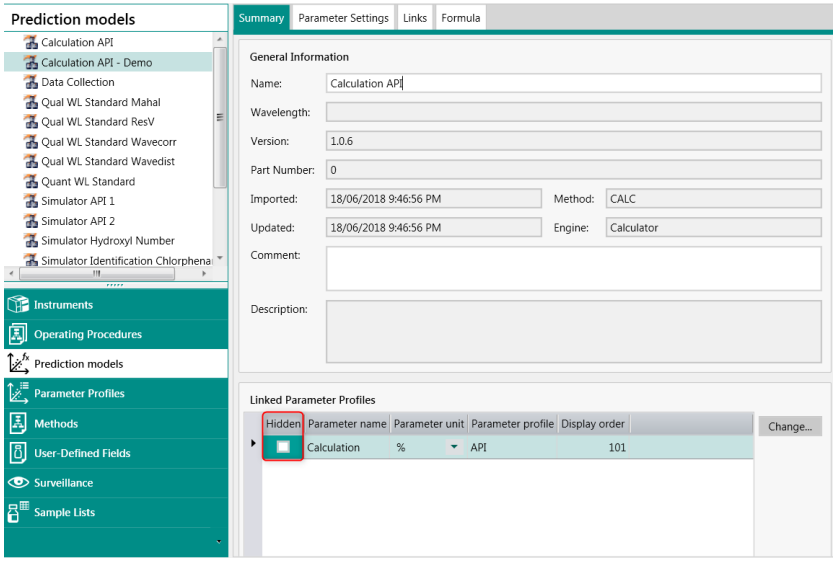
if ([API Full] > 10 ; [API 2] ; [API 1])

Parameter 1 Then Parameter 2 Else Parameter 3

"If" expressions are put in brackets, the parameter profile names are written in brackets and "then" and "else" expressions are written with ";".

3 Save the calculated prediction model. Add the calculated prediction model to the operating procedure that you want to use for postprocessing.

Make sure that the operating procedure includes the prediction model for which the postprocessing should be conducted. If the result of the prediction model shall not be displayed, select the prediction model, go to the **Summary** tab and check **Hidden** in the **Linked parameter profiles** window.



Make sure that the **Parsing results** field indicates that the entered formula is valid. If the formula is not valid, the prediction model cannot be saved.

3.3.7 User-defined prediction model

An operating procedure can never consist of user-defined prediction models only.

It is possible to manually add sample parameter data that is measured with other instruments.

User-defined prediction models can be created by right-clicking on an element in the structure Window and selecting **[Create User-defined Prediction Model...]**.

If you create an operating procedure with 2 user-defined prediction models, the sample results include positions for both user-defined prediction models.

During a measurement, a dialog window pops up and the user can type in the values.

3.3.8 Slope/intercept calculations

Slope/intercept data can be displayed for quantitative prediction models in the **Prediction models** section, **Slope/intercept** tab.

Values for slope and intercept can be changed manually in the **Prediction models** section on the **Slope/intercept** tab.

The slope/intercept can be changed for a single prediction model or for an instrument. The option to adjust the slope/intercept for an instrument is sometimes required when the same prediction model is used on multiple

instruments. Though beeing reference standardized, slight variation between the instruments is possible.

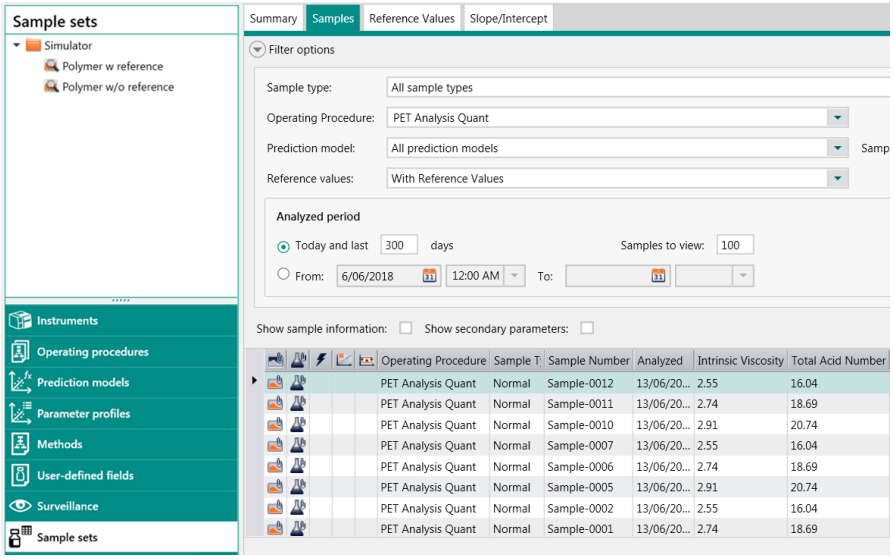
The slope/intercept values can be adjusted for selected instruments or for a prediction model that affects all instrument by using this prediction model.

To calculate the slope/intercept correction, a sample list is needed.

The samples that are used for slope/intercept calculation need a reference value for the parameter that should be corrected.

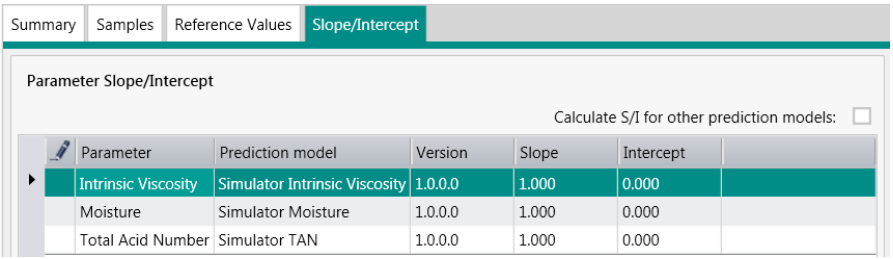
Make sure that at least 10 samples are available for the calculation of the slope/intercept value.

Using the filter settings in the sample work tab allows you to find matching samples.



In the **Sample lists** section on the **Reference values** tab, reference values can be added or adjusted.

In the **Sample lists** section on the **Slope/intercept** tab, the correction for the individual parameters can be conducted. 3 parameters are available in the presented example.



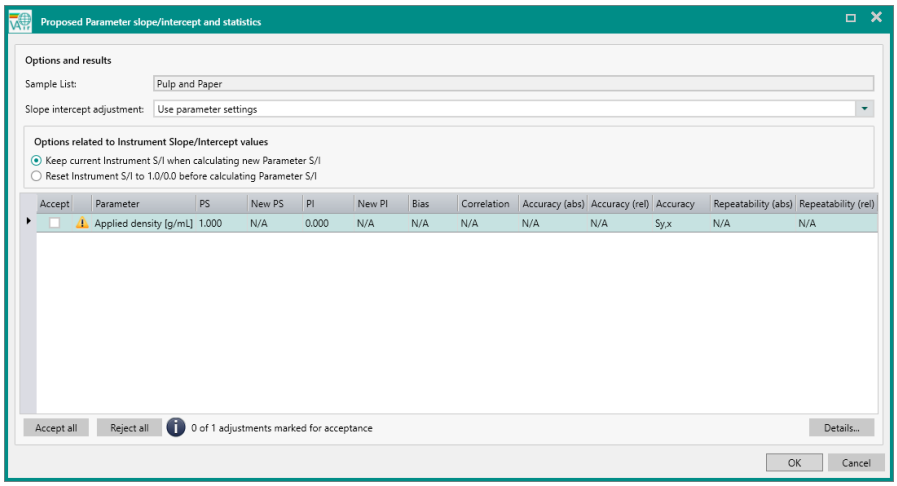
The procedure for slope/intercept correction is identical for instruments and for prediction models.

The procedure for the correction is explained for the parameter moisture.

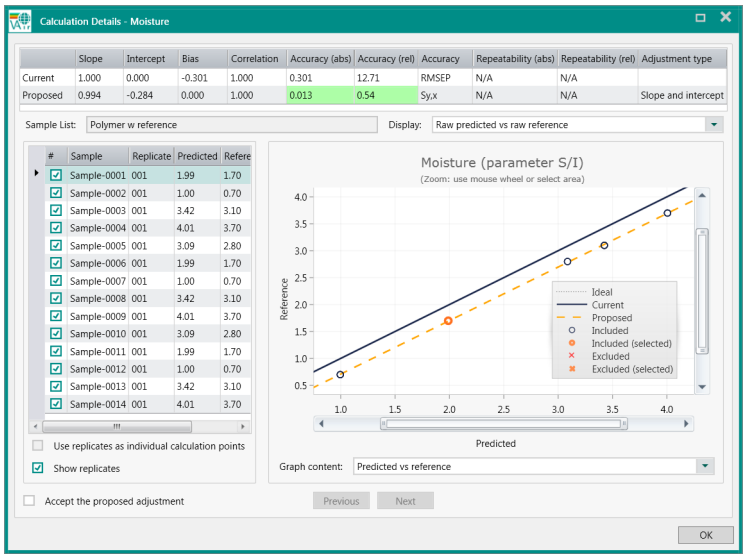
To start a parameter correction, proceed as follows:

1 Select the parameter you want to correct and click on **[Calculate slope/intercept]**.

A window with suggested adjustments is displayed.



2 Click on **[Details...]** to see the current correlation plot and the new correlation proposal.



The graph section displays the samples as dark blue dots on the gray reference lines. The plot gives an overview of the correlation, the bias, the slope and the presence of outliers.

In this example, predicted values are biased by -0.301. Correction of the slope and mainly the intercept correct for this deviation between predicted values and reference values.

The table in the upper part of the window indicates the improvement of the absolute accuracy and the relative accuracy as a result of the correction.

Zoom in by pointing in the graph area and rolling the mouse wheel. A zoomed in graph can be moved around by using click and drag. Pointing on a sample in the list displays the sample in orange in the graph. Remove a sample from the calculation by unticking the sample in the **#** column of the list.

3 Check **Accept the proposed adjustment** to accept the changes.

3.3.9 Specific functions for DS2500 Solid Analyzer

With the DS2500 Solid Analyzer, the average result of multiple sample cups (cups per sample) and multiple positions within the sample (number of subsamples) can be calculated.

To analyze multiple positions and cups, proceed as follows:

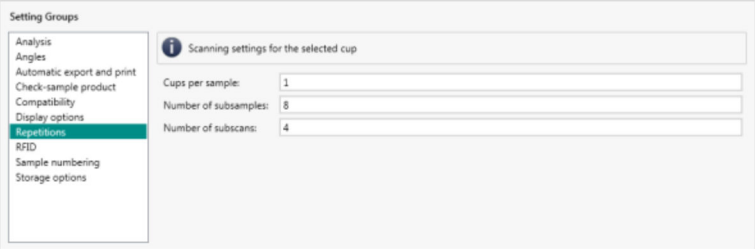
1 Go to the **Methods** section.

2 Select the method for which you want to configure the number of cups and positions.

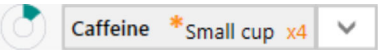
3 Go to the **Summary** tab. Select a sample vessel type that supports this functionality.

Table 4

Sample vessel type	Intended purpose
Large cup	Subsample Multiple cups per sample
Small cup moving	Subsample Multiple cups per sample
Small cup	Multiple cups per sample
Slurry cup	Subsample Multiple cups per sample
No cup	Multiple cups per sample
Multisample cup	None



During the analysis, the expected number of cups is displayed in Vision Air Routine:



When starting the analysis in Vision Air, the sample registration view is displayed as usual but the user is prompted for the next cup. Finally, the mean result for the cups is displayed.

Multisample Cup

The Multisample Cup is supported with Vision Air 2.0.2.25.

To select trays in Vision Air Manager, proceed as follows:

1. Go to the **Methods** section.
2. Select the method for which you want to configure the tray.
3. Go to the **Summary** tab in the data window and make sure that the **Sample vessel** field has the value: **Tray**.
4. Go to the **Settings** tab in the data window and select the menu item **Tray configuration**.
5. Select a pre-defined tray from the drop-down list.

   If a customized tray has been ordered together with Vision Air, a configuration file is provided by Metrohm. Import this configuration file by using the **Custom tray configuration** import.
6. Click on **[Save]** in the toolbar.

Calibrating the instrument in Vision Air Routine

2 different processes for instrument calibration are available. One process uses the internal built-in wavelength filter. The other process uses the external wavelength filter. For intensity corrections, the DS2500 Solid Analyzer uses the external reflection standard as reference standard. Only external wavelength filters can be certified.

The instrument must be running for 2 hours before starting the instrument calibration. For external instrument calibration, have the corresponding external wavelength filters ready.

1 In Vision Air Routine, go to the **Tools** section.

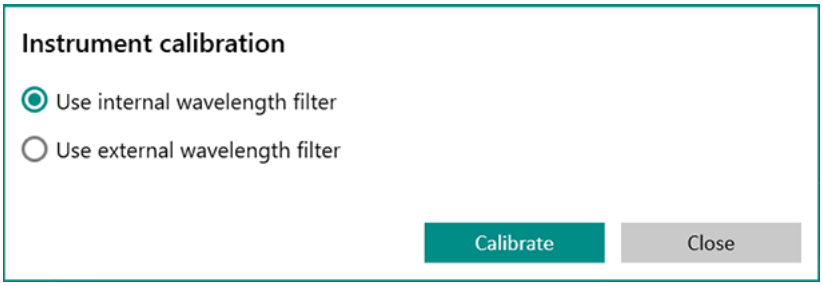
2 Click on **[Instrument calibration]**.

A window opens that prompts the user to enter the PIN code.

3 In non-pharma versions of Vision Air, enter your PIN code. The default PIN code is 1234. Click on **[OK]**.

In pharma versions of Vision Air, the user rights define whether a user has access to instrument calibration. No PIN code is required.

The **Instrument calibration** window opens.



4 Select whether to use the internal wavelength filter or the external wavelength filter.

Click on **[Continue]** to proceed.

5 Click on **[Calibrate]**.

The instrument is calibrated.

A message confirms the successful calibration. The instrument is ready to measure samples.

3.3.10 Specific functions for DS2500 Liquid Analyzer

With the DS2500 Liquid Analyzer, multiple sample vessels are available to address different sample absorbance levels and to enable a convenient operation of the instrument.

To analyze multiple sample vessels and positions, proceed as follows:

1 Go to the **Methods** section.

2 In the **Method** structure window, select the method for which you want to configure the number of sample vessels and positions.

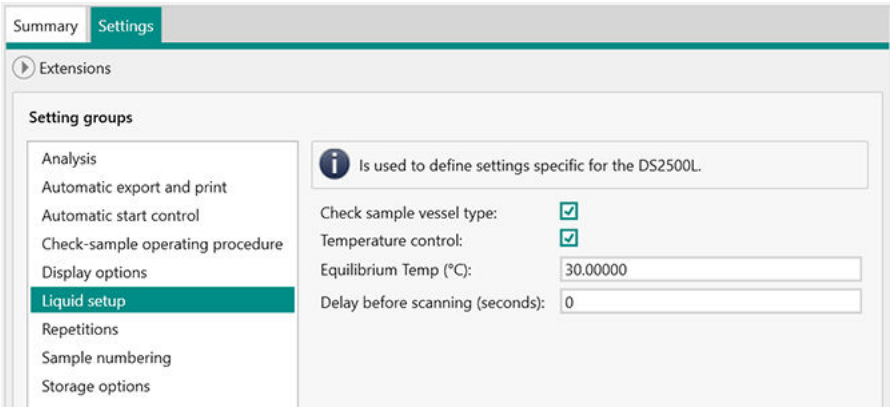
3 Go to the **Summary** tab.

Select a sample vessel type that supports the desired functionality from the **Sample vessel** drop-down list.

Table 5

Sample vessel type	Intended purpose
Disposable vials	One-time use No sample vessel cleaning
Cuvettes	High precision measurements
Flow cell cuvette	Automatization
Transmission wavelength standard	External calibration of the instrument

Heating and cooling the sample



The DS2500 Liquid Analyzer supports a temperature range between 25 °C and 80 °C. The minimum temperature that can be set must be 10 °C above the ambient temperature $T_{min} = T_{ambient} + 10$ °C

To achieve a temperature of 25 °C, the ambient temperature must be 15 °C. As the ambient temperature in most laboratories is approx. 25 °C, Metrohm recommends to set the temperature to a minimum of 35 °C.

To define the target temperature during an analysis, go to the **Methods** section in Vision Air Manager. Go to **Settings** ▶ **Liquid setup**. Enable **Temperature control**. Enter the desired temperature in **Equilibrium Temp (°C)**.

A delay before starting a scan ensures that the sample has the same temperature as the sample holder. To define a delay before each scan, go to

the **Methods** section in Vision Air Manager. Go to **Settings** ▶ **Liquid setup**. Enter the desired length of the delay in **Delay before scanning (seconds)**.

Temperature correction

If you set a sample temperature, the sample holder is heated or cooled to this temperature. There may be slight differences between the temperature of the sample holder and the temperature of the sample.

To correct the sample temperature, proceed as follows:

Temperature control must be enabled for the method that is linked to the operating procedure in use.

1. Go to the **Tools** section. Click on **[Temperature correction]**.
   A window opens that prompts the user to enter the PIN code.
2. Enter your PIN code. The default PIN code is 1234. Click on **[OK]**.
   The **Temperature correction** wizard opens.
3. Click on **[Start]** to proceed.
4. Follow the instructions on the appearing window.
   Then click on **[Next]** to proceed.
5. Enter the desired sample temperature. Click on **[Save]**.
   A confirmation window appears.
6. Click on **[Close]** to exit the wizard.
   Temperature correction is applied to the sample.

Measurement with open lid

It is possible to measure a sample while the lid of the DS2500 Liquid Analyzer is open.

Automatic start

If **Automatic start** is enabled, then the measurement starts automatically as soon as the lid is closed.

1. In Vision Air Manager, go to the **Methods** section.
2. Go to the **Settings** tab.
3. Open the setting group **Automatic start control**.

4 Enable **Automatic start**.

The measurement starts as soon as the lid is closed.

After the measurement, the lid opens automatically.

Calibrating the instrument in Vision Air Routine

The DS2500 Liquid Analyzer is calibrated with an external wavelength standard *(see "Calibrating the instrument with an external wavelength calibration standard", page 83)* and with an internal wavelength standard *(see "Calibrating the instrument with an internal wavelength standard", page 84)*.

The external calibration is usually carried out by a regional Metrohm service representative during the start-up of the instrument. If necessary, the external standard can also be obtained separately (article number 6.7494.000). The user can repeat the external calibration if needed. Only external wavelength filters can be certified.

The internal calibration uses the internal built-in wavelength filter. Carry out the internal calibration once a different type of sample vessel to the one used in the previous measurement is inserted. The path length is relevant. Carry out an internal calibration after a DS2500 Holder for 2 mm disposable vials was replaced with a DS2500 Holder for 8 mm disposable vials, for example.

For intensity corrections, the DS2500 Liquid Analyzer uses air as reference standard.

WARNING

Hot surface

Danger of burning due to hot components. The sample holder can be heated to a maximum of 80 °C. After operation, the sample compartment, the sample holder and the sample vessel are very hot.

- Wear protective gloves when handling sample holders and samples.

Calibrating the instrument with an external wavelength calibration standard

Accessories

- DS2500 liquid wavelength calibration standard (6.7494.000)

Precondition

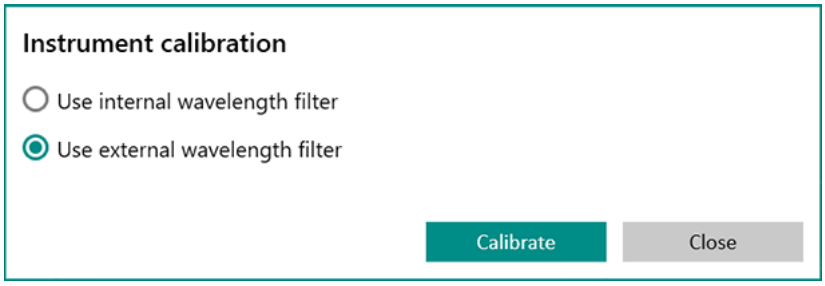
- The instrument must be running for 2 hours before starting the instrument calibration. For external instrument calibration, have the corresponding external wavelength filters ready.

1 Using the wavelength calibration standard

- Place the wavelength calibration standard in the sample compartment.
- Optionally place the cover plate on the sample compartment. If the sample holder is heated, the cover plate protects the user from the heat that is generated.
- Tighten the screw.

2 Calibrating the instrument

- In Vision Air Routine, go to the **Tools** section.
- Click on **[Instrument calibration]**.
  A window opens that prompts the user to enter the PIN code.
- Enter your PIN code. The default PIN code is 1234. Click on **[OK]**.
  The **Instrument calibration** window opens.



- Select **Use external wavelength filter**.
- Click on **[Calibrate]**.
- Follow the instructions on the appearing window.
  The wavelength filter is heated up to 50 °C automatically.

The instrument is calibrated.

A message confirms the successful calibration. The instrument is ready to measure samples.

Calibrating the instrument with an internal wavelength standard

Accessories

- Sample holder

Precondition

- The instrument must be running for 2 hours before starting the instrument calibration. For external instrument calibration, have the corresponding external wavelength filters ready.

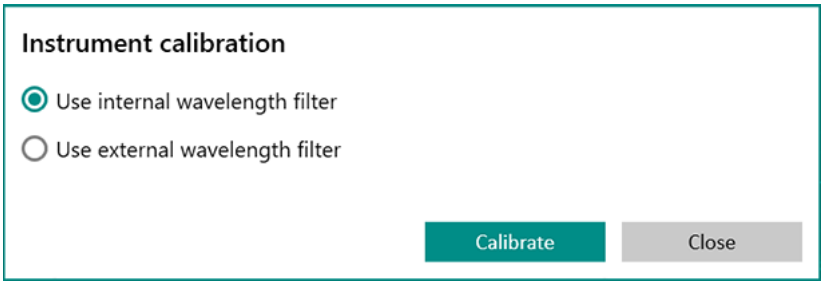
1 Inserting the sample vessel

- Define with which sample vessel the next measurement is to be carried out.
- Insert the selected sample vessel.

If an incorrect sample vessel was inserted for the calibration with the internal wavelength standard, the error **auto linearization failed** may be displayed during the routine analysis.

2 Calibrating the instrument

- In Vision Air Routine, go to the **Tools** section.
- Click on **[Instrument calibration]**.
  A window opens that prompts the user to enter the PIN code.
- Enter your PIN code. The default PIN code is 1234. Click on **[OK]**.
  The **Instrument calibration** window opens.



- Select **Use internal wavelength filter**.
- Click on **[Calibrate]**.

The instrument is calibrated.

A message confirms the successful calibration. The instrument is ready to measure samples.

3 Repeating the calibration

Once a sample vessel with a different path length has been inserted, repeat the internal calibration. To do this, start with Step 1 again.

3.3.11 Specific functions for XDS MasterLab

Two measurement modes are possible with the XDS Masterlab Analyzer. On start-up of Vision Air Routine that is connected to an XDS Masterlab Analyzer, you are asked which mode to use.

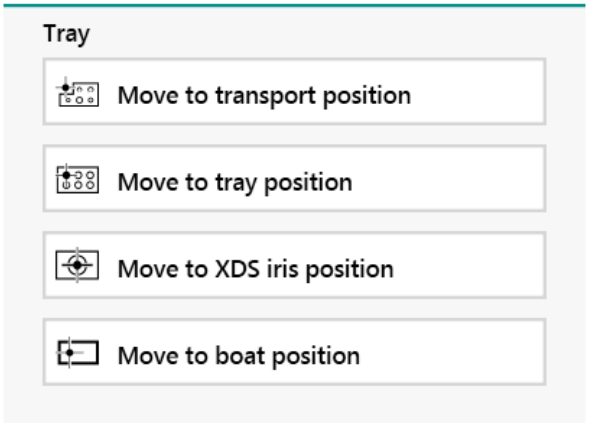
To start up Vision Air Routine, choose between **Reflectance mode** or **Transmission mode.**

To move trays manually in Vision Air Routine, proceed as follows:

In Vision Air Routine, the tray can be moved to different positions.

1 Go to the **Tools** section.

2 Select 1 of the following options to move the tray manually.



To select trays in Vision Air Manager, proceed as follows:

1 Go to the **Methods** section.

2 Select the method for which you want to configure the tray.

3 Go to the **Summary** tab in the data window and make sure that the **Sample vessel** field has the value: **Tray**.

4 Go to the **Settings** tab in the data window and select the menu item **Tray configuration**.

5 Select a pre-defined tray from the drop-down list.

If a customized tray has been ordered together with Vision Air, a configuration file is provided by Metrohm. Import this configuration file by using the **Custom tray configuration** import.

6 Click on **[Save]** in the toolbar.

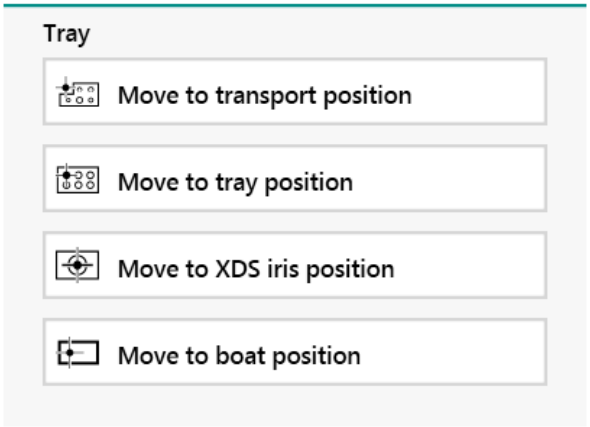
3.3.12 Specific functions for XDS MultiVial

To move trays manually in Vision Air Routine, proceed as follows:

In Vision Air Routine, the tray can be moved to different positions.

1 Go to the **Tools** section.

2 Select 1 of the following options to move the tray manually.



To select trays in Vision Air Manager, proceed as follows:

1 Go to the **Methods** section.

2 Select the method for which you want to configure the tray.

3 Go to the **Summary** tab in the data window and make sure that the **Sample vessel** field has the value: **Tray**.

4 Go to the **Settings** tab in the data window and select the menu item **Tray configuration**.

5 Select a pre-defined tray from the drop-down list.

If a customized tray has been ordered together with Vision Air, a configuration file is provided by Metrohm. Import this configuration file by using the **Custom tray configuration** import.

6 Click on **[Save]** in the toolbar.

3.3.13 Specific functions for XDS RapidLiquid

The RapidLiquid Analyzer supports a software controlled heating functionality.

To define temperature control and blank correction, proceed as follows:

1. Go to the **Methods** section.
2. Select the method to configure the temperature control.
3. Go to the **Settings** tab in the data window and select **Liquid setup**.
4. Define your settings for temperature control and blank correction.

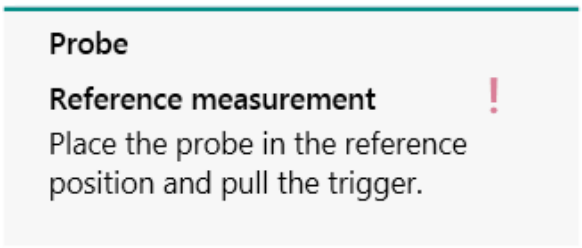
   If blank correction is activated, the user is guided through the process of blank correction in Vision Air Routine.

Blank correction, correcting the effect of the used sample holder, has to be conducted once before the first measurement.

3.3.14 Specific functions for XDS SmartProbe and XDS Interactance Probe

Reference scan

Reference measurements with the XDS SmartProbe and the XDS Interactance Probe are conducted by placing the probe into the respective position of the instrument. Whenever a reference measurement is needed, the user is informed in the information field of Vision Air Routine.



The time period between individual reference scans can be set in Vision Air Manager. The maximal time period is 60 minutes.

A permanent installation of the probe into a system is not suggested due to maximum validity of a reference scan of 60 minutes.

4 Installation

4.1 Vision Air Server

4.1.1 System requirements

Table 6 Vision Air Server

Operating system	Windows Server 2012 R2 Full Edition with Service Packs / Windows Server 2016 / Windows Server 2019 Operating System Language must be English (during installation only)
CPU	Dual 2 GHz processors
Memory (RAM)	8 GB
HDD	80 GB free space (dependent on data storage needs) NTFS File System
Video	SVGA at 1024x768, 16 bit color
NIC	1 Gbit Ethernet
Database Server	Microsoft SQL Server 2014 / 2016 / 2017
Connectivity	2-5 open ports on firewall (Incoming). The number of ports depends on the instrument type and proxy server configuration. External IP address or DNS address (recommended) for external clients to be able to communicate with the Vision Air Server. SMTP account for emailing reports and Vision Air Manager download links (optional).
Additional software and requirements	Internet Information Services (IIS) Server role .NET 4.8 Framework Extended Crystal Reports 13.01 runtime (included) MATLAB Compiler Runtime 8.0 (installed separately)

All needed software can be found on the provided DVD.

4.1.2 General information Vision Air Server

Microsoft SQL Server

Vision Air Server uses the Microsoft SQL Server for all data storage *(see "System requirements", chapter 4.1.1, page 89)*. SQL Server Management Studio is required for the initial configuration of the Microsoft SQL Server *(see " Configure SQL Server ", page 93)*. Purchase and install Microsoft SQL Server and SQL Server Management Studio separately. Metrohm does not supply Microsoft SQL Server.

Communication protocols

Communication between the Vision Air Server and Vision Air clients is based on WCF and TCP or HTTP and is encrypted with a SSL certificate. The HTTP version is intended for use only by customers with Proxy servers that limit TCP communications.

DNS URL Address

A DNS address is recommended in order for Vision Air clients to locate and communicate with the Vision Air Server. Please contact your IT department for the DNS URL prior to beginning the installation process, e.g. VisionAir.yourcompany.com.

The Vision Air clients can also connect using an IP address but each instrument will need to be reconfigured if the IP address ever changes. Use of a DNS URL Address will allow for changing the Vision Air Server IP address without reconfiguring each instrument.

SSL Certificate

Communication between the Vision Air Server and clients is secured using a SSL certificate installed on both the Vision Air Server and the client PC. Metrohm NIRSystems provides a SSL certificate during the Vision Air Server installation.

A custom SSL certificate, e.g. VisionAir.yourcompany.com, may be used instead of the one provided by Metrohm NIRSystems. There are no requirements for custom certificates other then it must not be expired. Communication between the Vision Air Server and clients cannot occur if the SSL certificate is missing or expired.

SMTP

The Vision Air Server uses SMTP for emailing installation links to users to assist in the installation of Vision Air Manager Network *(see "Distribution of the Vision Air Manager Network", chapter 4.2.2, page 116)*. Vision Air Server can also be configured to email scheduled surveillance reports to instrument managers.

Both features are optional and will require an SMTP Server, a SMTP port and a user name and password (when anonymous relaying is prohibited).

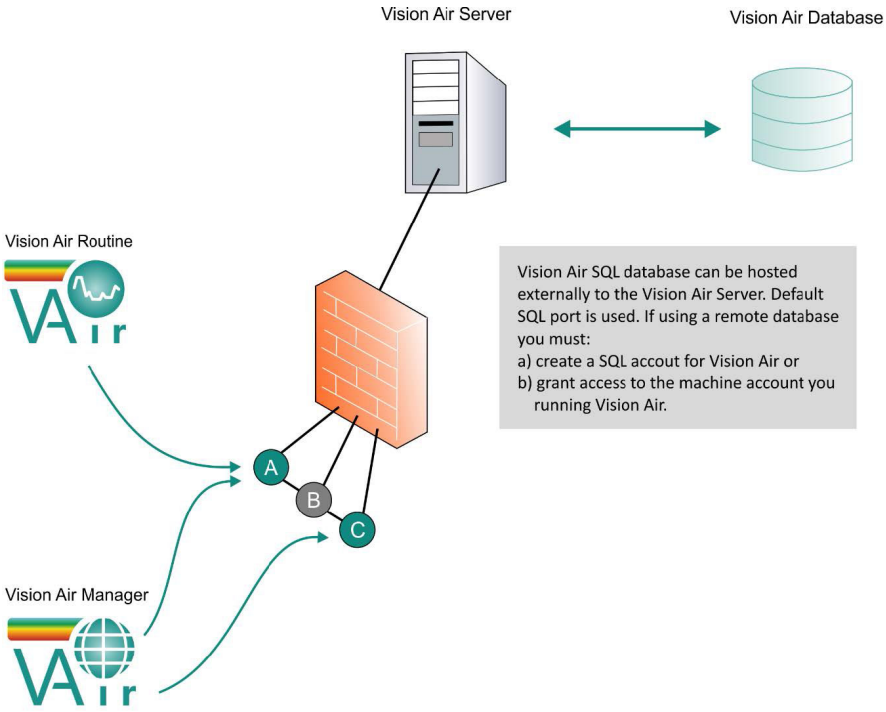
Computer virus prevention

Metrohm NIRSystems recommends that our customers maintain continuous protection of their computers and network infrastructure from threats posed by computer viruses, worms, and other types of hostile computer programs.

This can be implemented by installing and frequently updating an appropriate anti-virus program on the PCs and connecting the PCs in a minor closed network.

Protection against computer viruses is solely the responsibility of the customer and Metrohm NIRSystems can not be held responsible for any damage these types of programs may cause including lost and corrupted data or data theft.

Server ports



CLIENT-SIDE PORTS: Communication is always initiated from the client. The same ports opened on the Vision Air Server must be open for outgoing traffic on the client. The ports do need to be opened on the client (or external client site) for incoming communication.

Please contact your IT department for any firewall port issues. Metrohm NIRSystems cannot make any changes to your firewalls.

Table 7

Port A: Required standard port for TCP communication with Vision Air Server (Vision Air clients). **Port B**: Alternative port for HTTP communication with Vision Air Server (Vision Air clients). **Port C**: Required HTTP port for ClickOnce installation and update of Vision Air Manager clients.	**E-mail account**: Vision Air has features for generating and sending e-mails to users. Such e-mails are sent from the Vision Air Server which in that case needs to be configured with a SMTP Relay agent (not mandatory).
Client and instrument ports: Communication is always initiated from the Vision Air client and the instruments. The same ports opened on the Vision Air Server/ firewall must be open for outgoing traffic only on the clients and instruments.	**Port numbers**: Metrohm recommends using ports in the 8000 range to reduce potential interference by other applications. The port range can be changed to meet the customer's needs.

4.1.3 Pre-installation

The Vision Air Server setup does not upgrade Microsoft SQL Server installation.

Vision Air Server installations connected to Microsoft SQL Server 2012 should be migrated to Microsoft SQL Server 2014 prior to upgrading to Vision Air Server 2.0.7.

SQL Server maintenance plans

Metrohm NIRSystems strongly recommends the use of SQL Server maintenance plans in order to keep Vision Air performing at peak performance and to prevent issues that normally occur through the long-term usage of any database.

At a minimum the following maintenance plans should be created and scheduled to run weekly:

- Database integrity
- Rebuild indexes
- Update statistics

Please consult the local IT department for assistance in creating the SQL Server maintenance plans.

SQL database backups and maintenance

It is the customer's responsibility to backup and safeguard the Vision Air data from loss. Metrohm NIRSystems cannot be held liable for data loss.

Metrohm NIRSystems strongly recommends that the Vision Air Server SQL database is backed up on a reoccurring and timely schedule, at a minimum daily, in order to safeguard the data from loss. This can be done by using any software capable of performing full system backups, full system snapshots or SQL Server backups. The Vision Air Server software does not contain any backup functionality.

Additionally, it is recommended that each SQL Server have an automated SQL maintenance plan to help ensure the health and optimization of the SQL Server. Please consult the local IT department for assistance in creating SQL maintenance plans.

SQL Server configuration

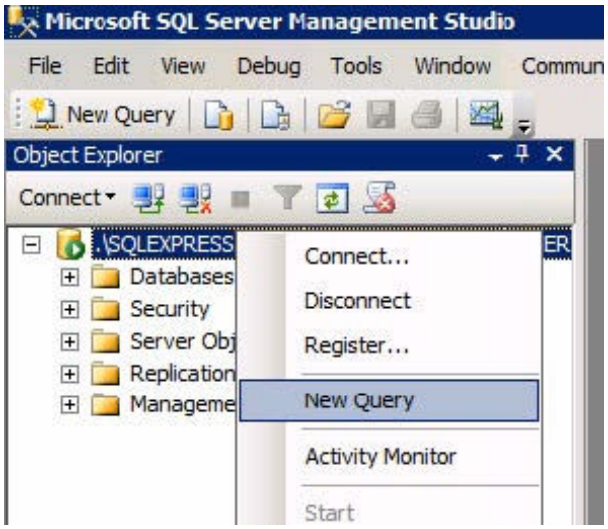
Before you begin to install Vision Air Server, purchase and install Microsoft SQL Server and SQL Server Management Studio separately. Metrohm does not supply or install SQL Server.

Configure SQL Server

1 Open **SQL Server Management Studio**.

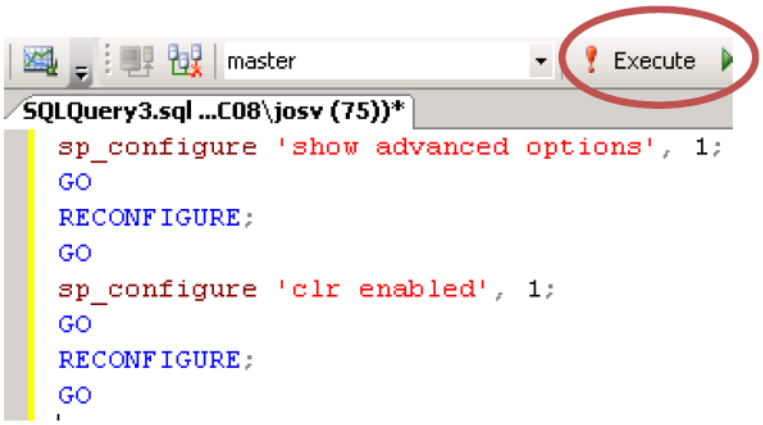
2 Connect to SQL Server instance created during SQL Server Installation.

3 Right-click on the SQL Server instance and select **New Query**.

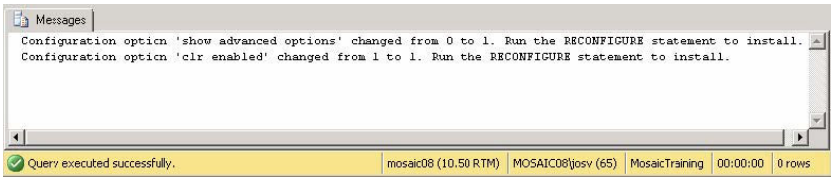


4

- Enter the query:
  Sp_configure 'show advanced options', 1;
  GO
  RECONFIGURE;
  GO
  Sp_configure 'clr enabled', 1;
  GO
  RECONFIGURE;
  GO
- Click on **[Execute]**



The results should display that the query was executed successfully with a message similar to the one below.



SQL Server Login Permissions

This section only applies if the SQL Server is installed on the same physical device as the Vision Air Server software.

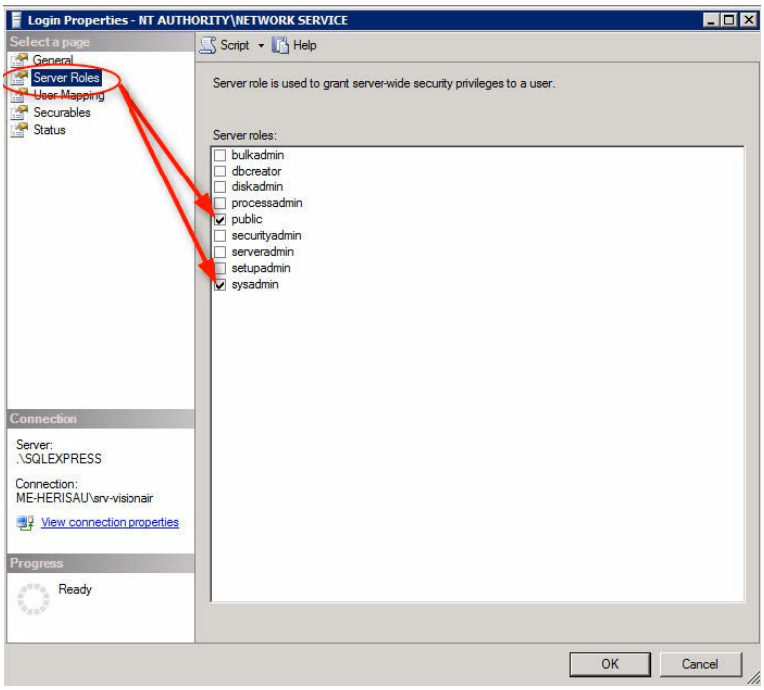
If SQL Server is installed on a separate server, *see Remote SQL Server configuration, chapter 4.1.4, page 97*.

1 Open **SQL Server Management Studio**.

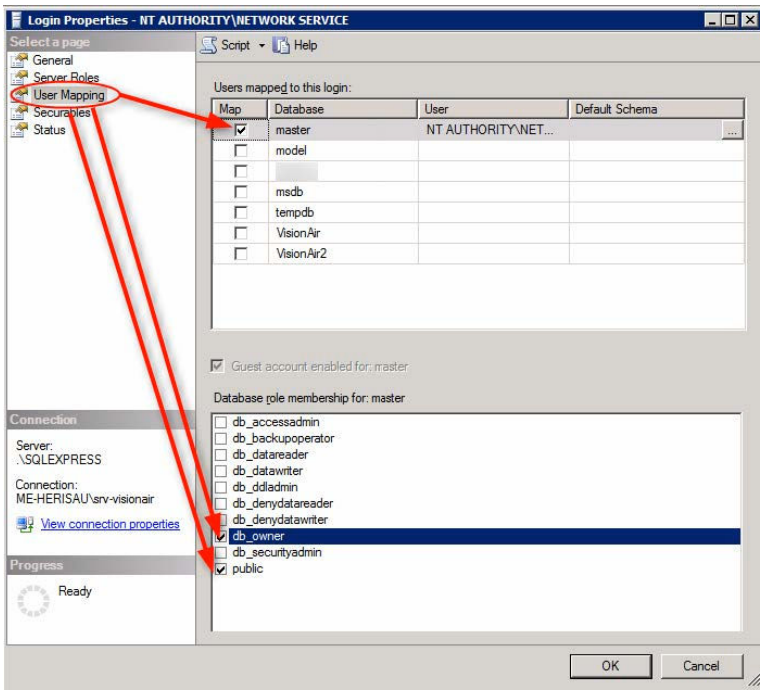
2 Connect to SQL Server instance created during SQL Server Installation.

3 Expand **Security** ▶ **Logins**. Right-click on **NT AUTHORITY\SYSTEM** ▶ **Properties**. If this login is not existing, create a login *(see "Create the Login", page 96)*.

4 Click on **Server Roles**. Verify that **public** and **sysadmin** are selected (checked). If not, select them.



5 Click on **User Mappings**. Verify that the **Database master** is selected and the roles are **db_owner** and **public**.

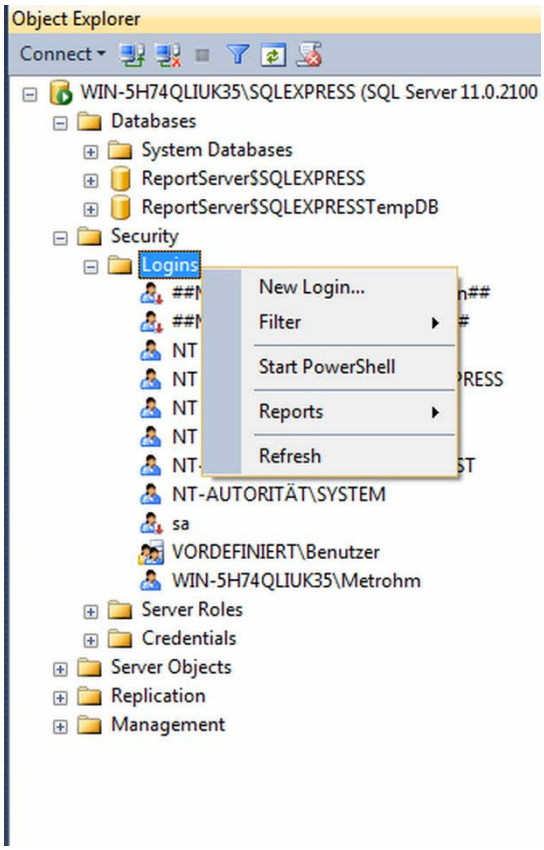


6 Click **[OK]** and exit.

Create the Login

1 Right-click on **Logins** ▶ **New Login...**.

2 Create a new user.



4.1.4 Remote SQL Server configuration

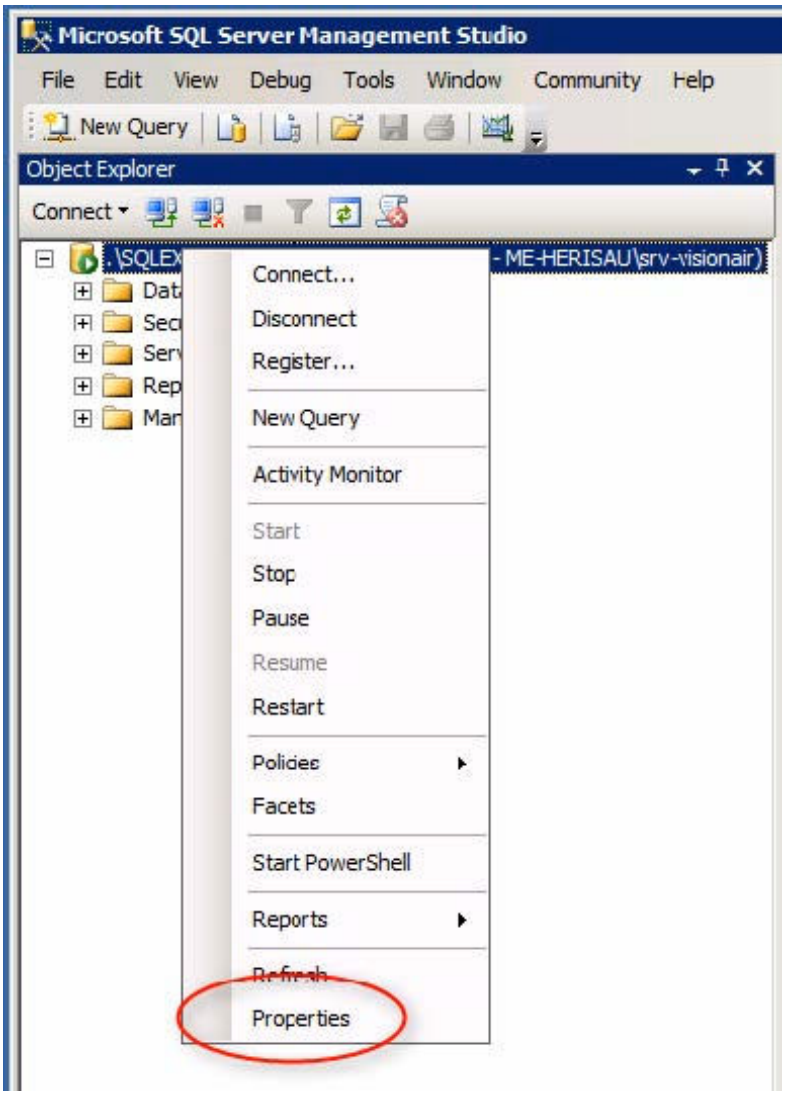
This chapter describes the installation procedure if the SQL Server and the Vision Air Server are installed on different hardware devices.

Configuring the SQL Server

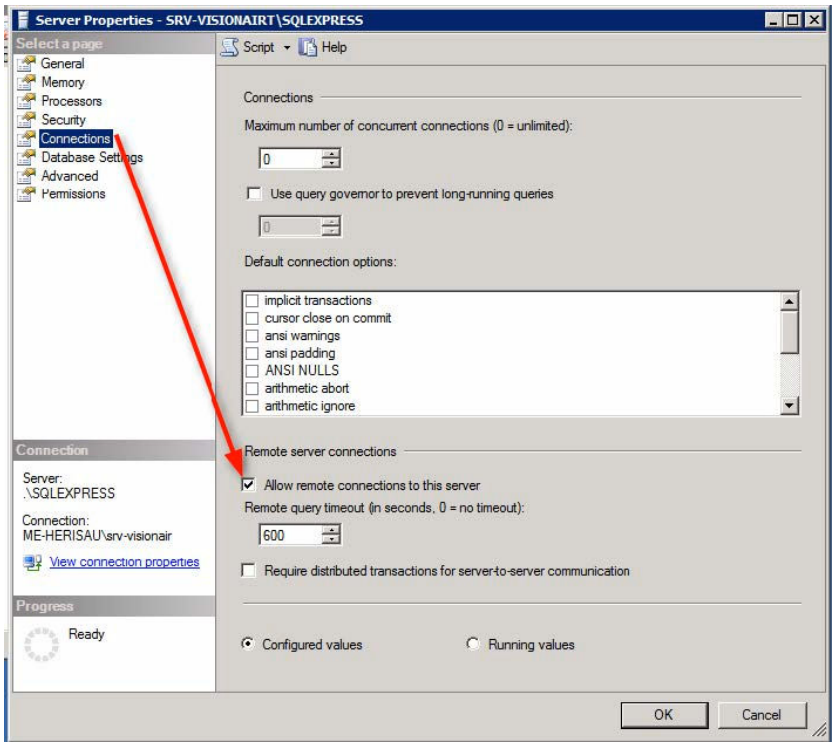
Allow remote connection to the SQL Server

1 Open SQL Management Studio and log in.

2 Right-click on the **server name** and select **Properties**.



3 Select the **Connections** page and place a check in **Allow remote connections to this server** checkbox. Click **[OK]**.



4 Close **SQL Management Studio**.

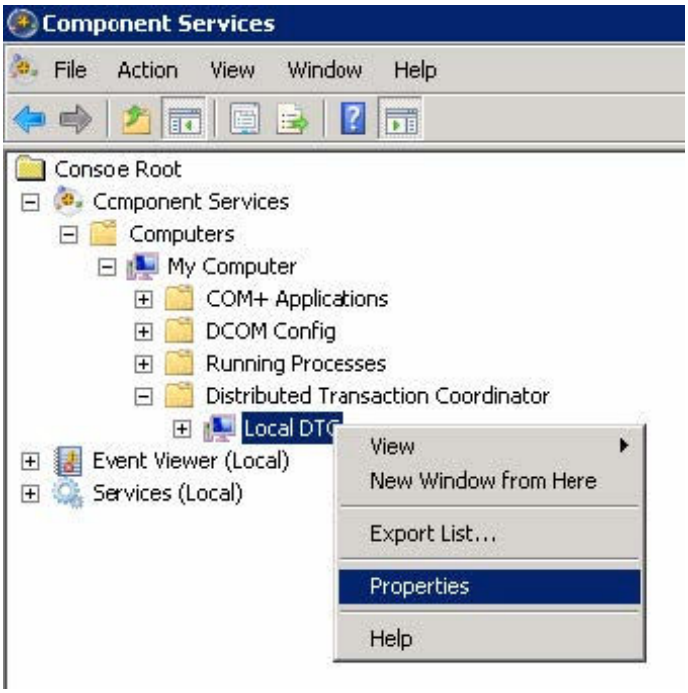
5 Click**Start** ▶ **Administrative Services** ▶ **Services**.

6 Verify the **SQL Server Browser** service Startup Type is **Automatic** and Status is **Started**.

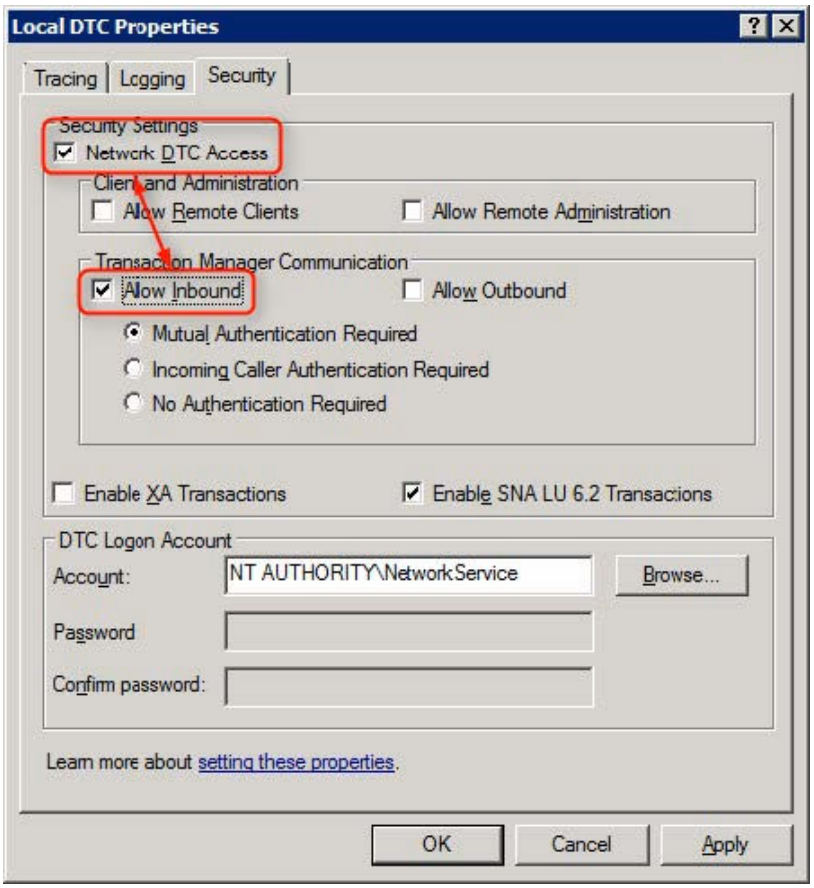
7 Verify the **Distributed Transaction Coordinator** service Startup Type is **Automatic** and Status is **Started**.

8 Configure DTC on the SQL Server to allow inbound transactions:

- Click **Start** ▶ **Administrative Tools** ▶ **Component Services**.
- Expand to locate **Local DTC**. Right-click on **Local DTC** and select **Properties**.



- Click on the **Security** tab.
  Place a check in **Network DTC Access** and **Allow Inbound**.



- In case of cross-domain setup select **No Authentication Required**.
- Click **[OK]** and close **Component Services**.
- Restart all the SQL services.

To check if DTC is working there are several options:

- Use DTCTester (tool from Microsoft).
- Use SQL Management Studio to try to create distributed transactions if you have a local SQL Server.

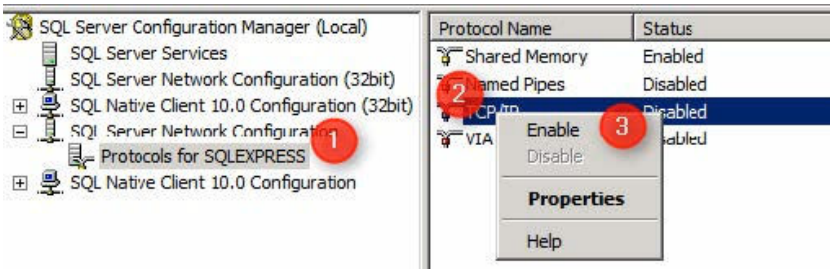
Enable TCP/IP protocol in SQL Server Configuration Manager

1 ClickStart ▶ All Programs ▶ Microsoft SQL Server 2008 ▶ Configuration Tools and select SQL Server Configuration Manager.

2 Expand SQL Server Network Configuration.

3 Highlight Protocols for SQL Server Name.

4 Right-click on TCP/IP and select Enable.



5 Click **[OK]**, close the SQL Configuration Manager and restart the SQL services.

Grant access to the Vision Air Server Account

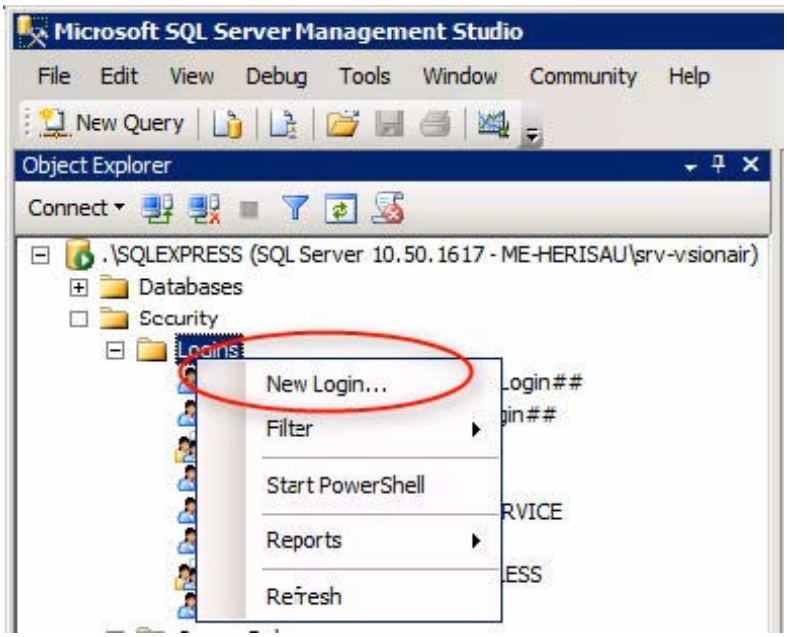
To connect using a Windows account:

1 Select if a machine account or a user account will be used:

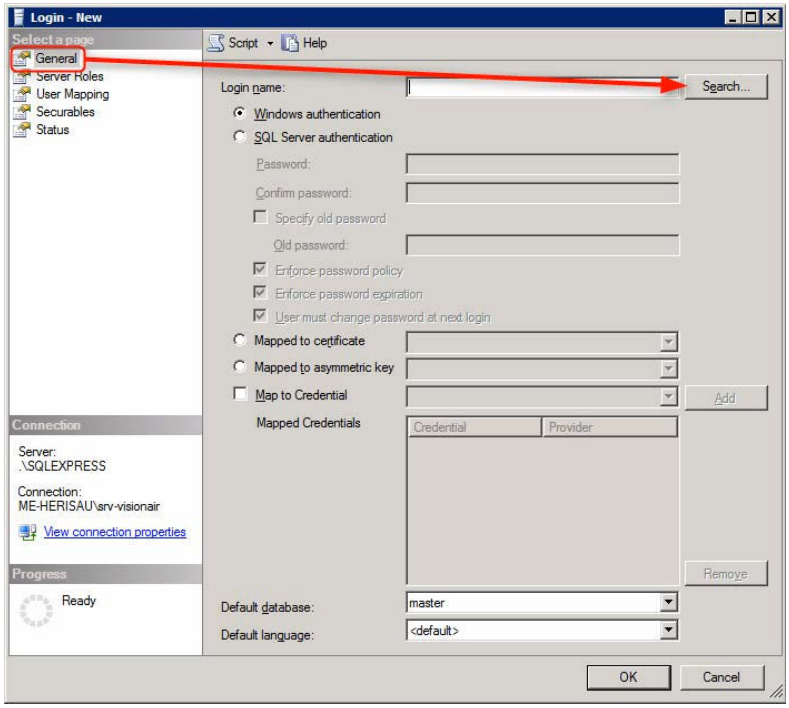
- <domain>\<machine>$ (like “DOMAIN\VISIONAIRPC$”) or
- <domain>\<accountname>

2 On the SQL Server open **SQL Server Management Studio** and log in.

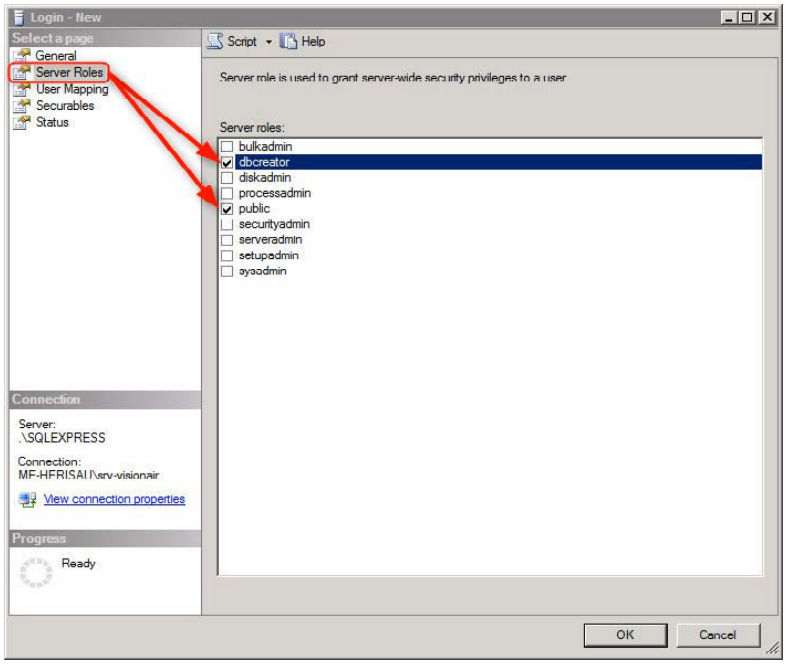
3 Expand **Security** and right-click on **Logins** and select **New Login**.



4 On the General page click **[Search]** to locate and add the Windows account which will communicate with the SQL Server (machine or user account).

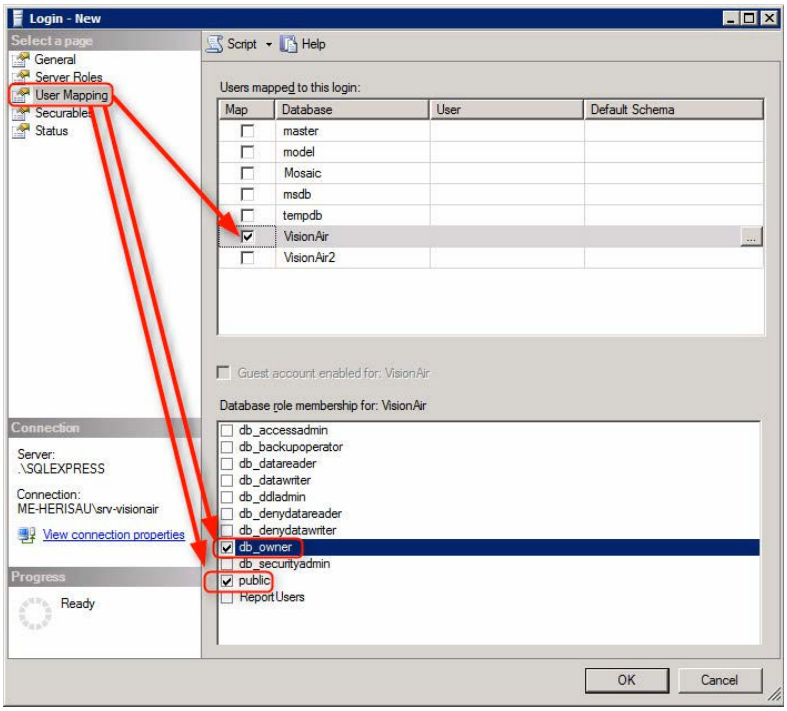


5 Click on **Server Roles** page and place a check next to **dbcreator** and **public**.



6 If the database already exists, click on **User Mapping** page. Add a check next to the database name and then **db_owner** and **public** in the role membership pane.

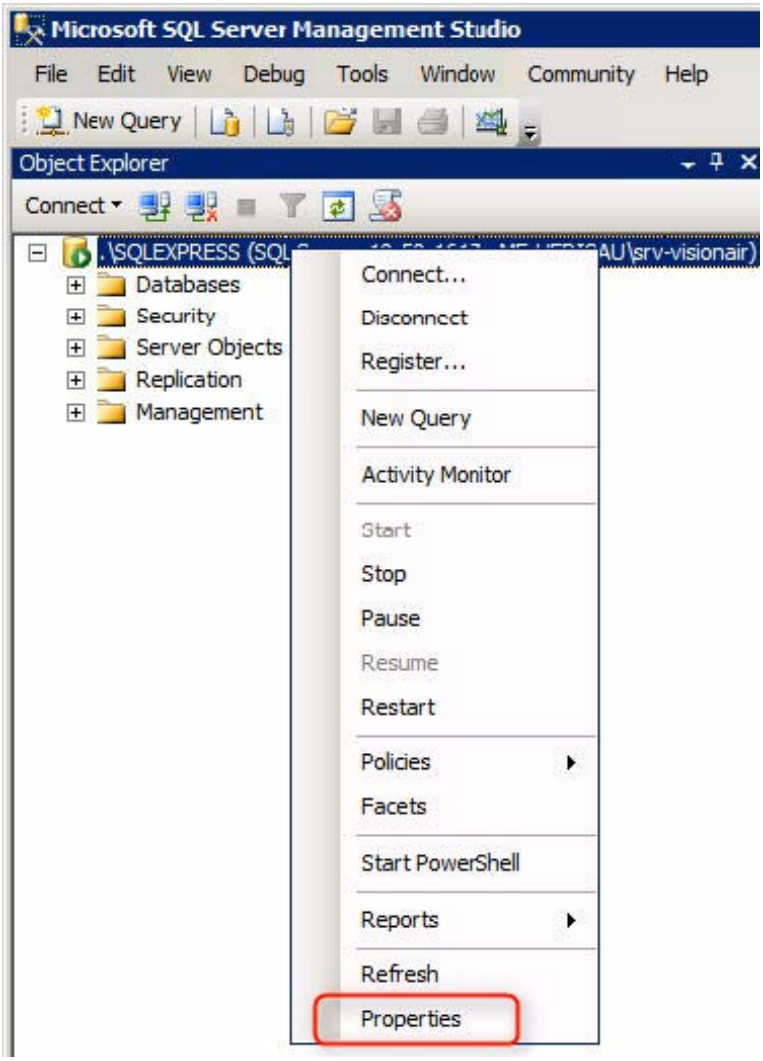
7 Click **[OK]** and exit **SQL Server Management Studio**.



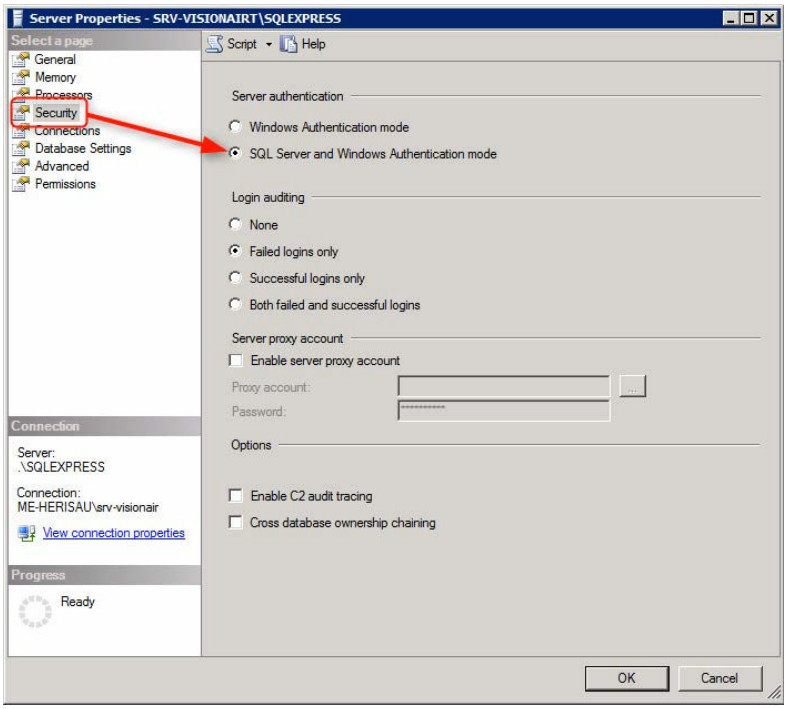
Connect using a SQL account

1 Open **SQL Server Management Studio** and log in.

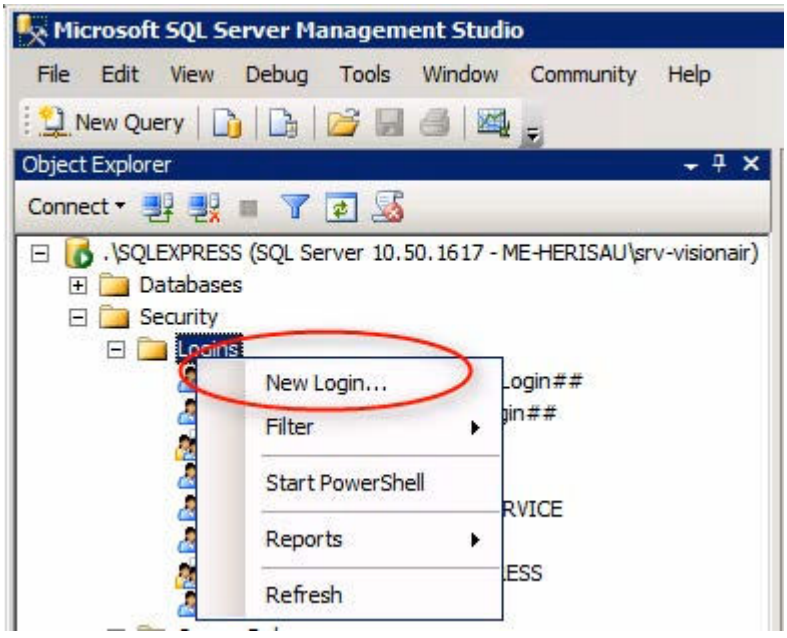
2 Right-click on the server name and select **Properties**.



3 Click on the **Security** page. Enable **SQL Server and Windows Authentication mode** radio button. Click **[OK]**.

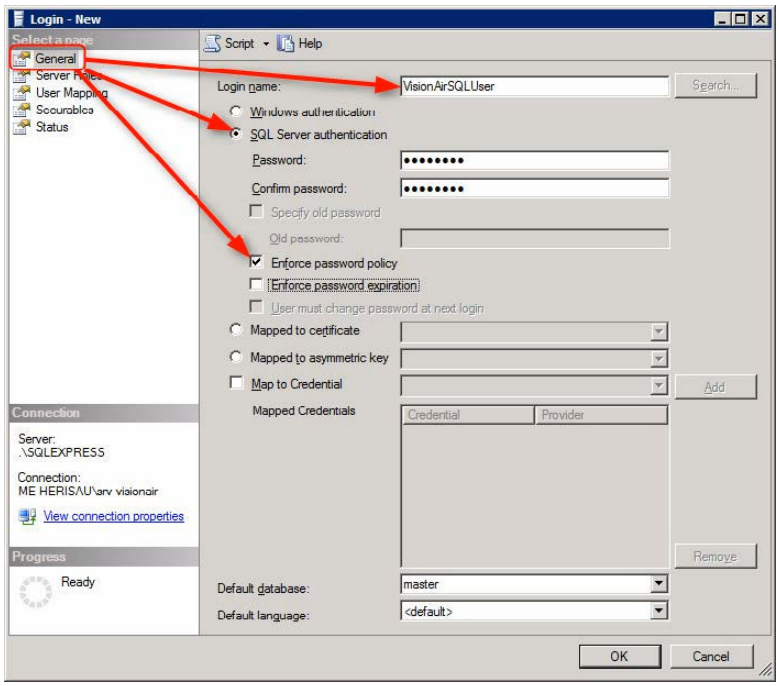


4 Expand **Security** and right-click on **Logins** and select **New Login**.

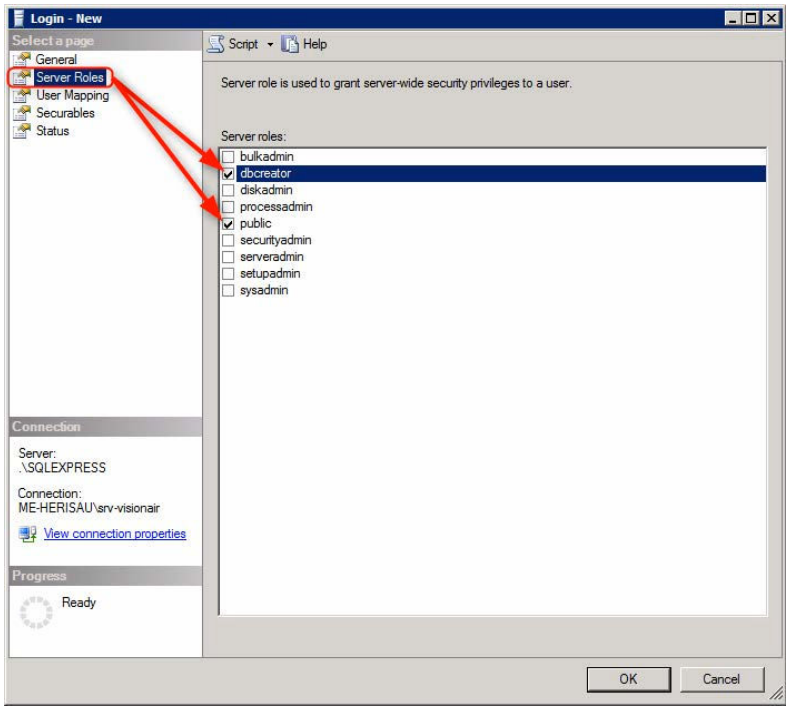


5 On the General page

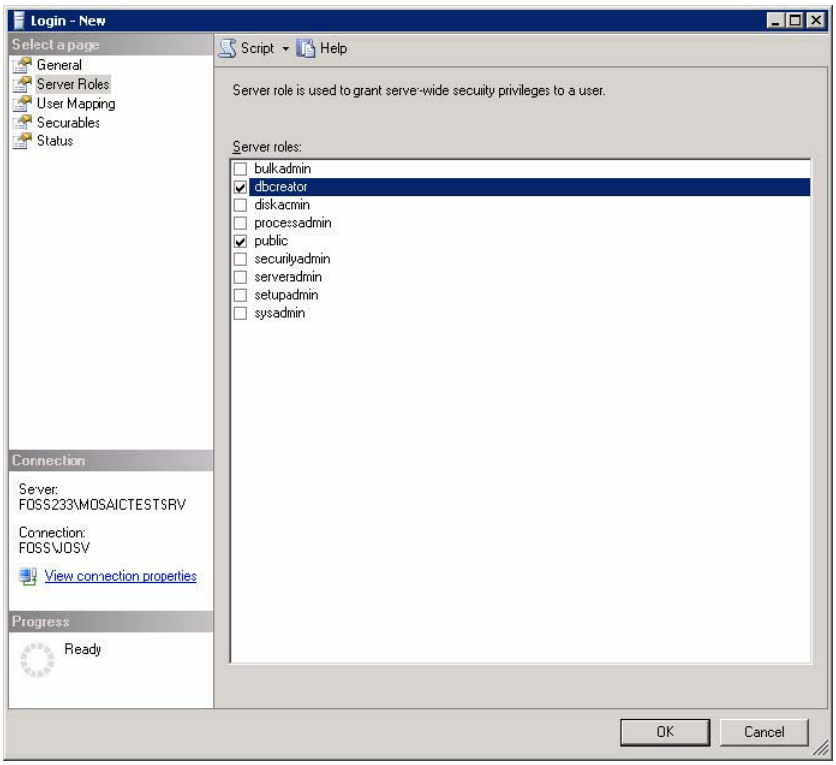
- Enter Login name.
- Select **SQL Server authentication**.
- Enter and confirm the password.
- Deselect **Enforce password expiration**.



6 Click on **Server Roles** page and place a check next to **dbcreator** and **public**.



7 If the database already exists, click on **User Mapping** page. Add a check next to the database name and then **db_owner** and **public** in the role membership pane.



8 Click **[OK]** and exit **SQL Server Management Studio**.

Configuring the Vision Air Server

Allow Outgoing Communication

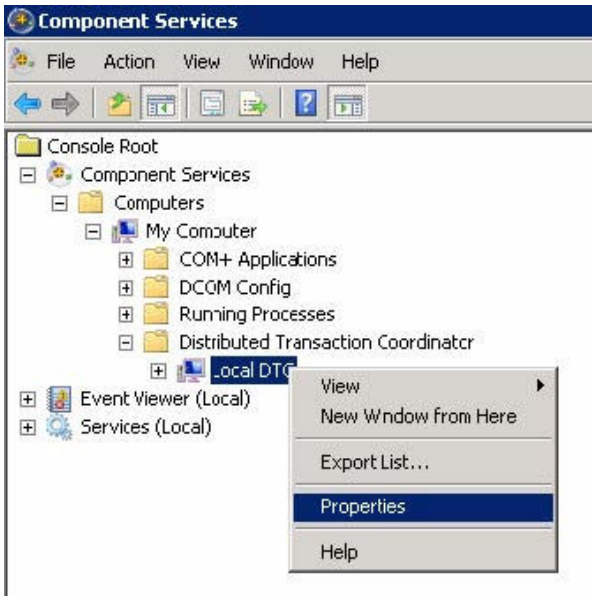
To install the SQL Server and Vision Air Server on different hardware devices, carry out the following steps during the SQL Server installation.

1 Click on **Start** and search for **Services**.

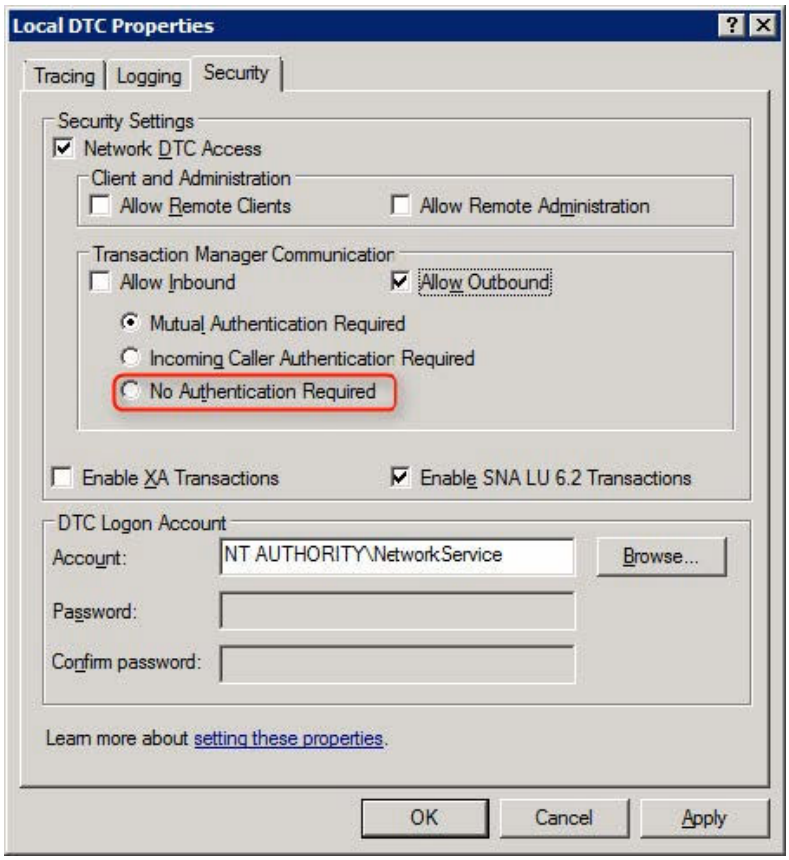
2 Verify the **Distributed Transaction Coordinator** service Startup Type is **Automatic** and Status is **Started**.

3 Configure DTC on the SQL Server to allow outbound transactions:

- Click on **Start** and search for **Services**.
- Expand to locate **Local DTC**. Right-click on **Local DTC** and select **Properties**.
- Click on the **Security** tab.



- Place a check in **Network DTC Access** and **Allow Outbound**.
- In case of cross-domain setup select **No Authentication Required**.
- Click **[OK]** and close **Component Services**.



- Restart the Vision Air Server.

To check if DTC is working, there are several options:

- Use DTCTester (tool from Microsoft).
- Use SQL Management Studio to try to create distributed transactions if you have a local SQL Server.

Fix dependency to SQL service

To install the SQL Server and Vision Air Server on different hardware devices, carry out the following steps during the Vision Air Server installation.

Configure a Vision Air Service so that it does not depend on SQL Server, but only on Distributed Transaction Coordinator.

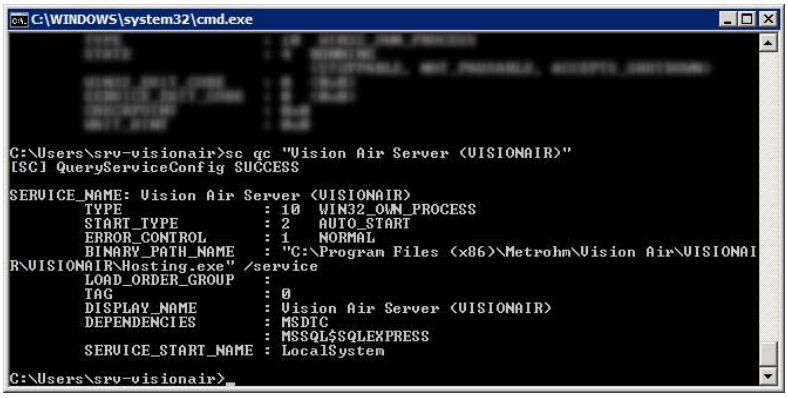
1. Open a command prompt.

2. Type *SC QUERY* and then press **[Enter]**.

3. Scroll through the list and make note of the Vision Air Service name. If the list is truncated, then export the list. Type "SC Query > services.txt". Go to the respective folder and open the .txt file.

```
SERVICE_NAME: Vision Air Server (VISIONAIR)
DISPLAY_NAME: Vision Air Server (VISIONAIR)
        TYPE               : 10  WIN32_OWN_PROCESS
        STATE              : 4  RUNNING
                                (STOPPABLE, NOT_PAUSABLE, ACCEPTS_SHUTDOWN)
        WIN32_EXIT_CODE    : 0  (0x0)
        SERVICE_EXIT_CODE  : 0  (0x0)
        CHECKPOINT         : 0x0
        WAIT_HINT          : 0x0
```

4. Get the configuration of Vision Air Service by typing *SC QC "Vision Air Service name"* and press **[Enter]**.



5. Remove the **SQL Server dependency** and leave the **Distributed Transaction Coordinator dependency** type *SC CONFIG "Vision Air Service name"* and press **[Enter]**.

```
C:\Users\srv-visionair>sc config "Vision Air Server (VISIONAIR)" depend= MSDTC
[SC] ChangeServiceConfig SUCCESS
```

6 To verify the SQL Server no longer appears under dependencies type *SC QC "Vision Air Service name"* and press **[Enter]**.

To configure the Vision Air service to depend on SQLEXPRESS and Distributed Transaction Coordinator: *sc config "Vision Air Service name" depend = MSDTC/MSSQL$SQLEXPRESS*.

Configure access to SQL Server

Depending on the account used for SQL Connection, you may need to configure Vision Air service to run as a specific domain account (which needs to be an administrator on the Vision Air Server) or to modify hosting. exe.config for SQL Authentication.

If you are using SQL authentication then update Vision AirConnectionString in hosting.exe.config so it looks like:

- Open C:\Program Files (x86)\Metrohm\Vision Air\VISIONAIR\VISIONAIR\Hosting.exe.config using Notepad.
- Search for MosaicConnectionString.
- Change the section after connectionString= to "Server=SERVERNAME\sqlexpress;Database=Vision AirXXX;pooling = false;User Id=USERNAME;Password=PASSWORD;Connection Timeout= 30".
- Vision AirXXX is the Service System Name of the Vision Air database.
- USERNAME is the SQL Login name set up in the previous section.
- PASSWORD is the password set for the SQL Login account.
- Verify the " symbols are included and the line ends with\>.

4.1.5 Installation of Vision Air Server

Site preparation

- The Site Preparation Check List (8.105.8026EN) must be completed before installation of any Vision Air component or interfacing software program.
- Verify that the firewall has been updated to allow incoming and outgoing traffic on new ports.
- Verify that DNS has been configured for Vision Air Server URL.
- Verify that the SSL certificate has been acquired and installed.
- Verify that the account used for installation is a full administrator account.

System and database backup

Metrohm NIRSystems strongly recommends that a full system backup or server snapshot is performed prior to running the Vision Air Server installation whenever upgrading the Vision Air software. In addition, it is strongly recommended to create a full SQL database backup of the Vision Air database before beginning the installation.

Installation

Shut down all other programs on the computer.

Make sure that the Windows language is set to English.

Make sure that you are logged in to the PC with administrator rights.

1 Insert the installation medium with Vision Air installer and double-click the installer for Vision Air Server.

2 Click on **[Next]**.

3 Read and accept the license agreement. Click on **[Next]**.

4 Before Vision Air Server is installed, the program will first check whether any necessary software components are missing on the PC.

The first time Vision Air Server is installed on a PC, all these software components will be installed one after the other. Follow the on-screen instructions and click on **[OK]** when prompted. When re-installing Vision Air at a later stage e.g. when upgrading to later versions, most of these necessary components will already be installed and the installation automatically skips these steps.

A reboot of the computer may be required during installation. If the installer does not start-up automatically after the reboot, please double-click the installer again.

5 Define the **Service System Name** and a **Location** for the new Vision Air Server instance:

Table 8

Field	Description
Location	Define a folder in the file system.
Service System Name	Displayed name of the Vision Air Server instance.

6 Click on **[Install]**

After successful installation, the Config Tool opens.

Installation log files can be found in the temp folder of your operating system. Open Windows Explorer and type in **[%temp%]**. In this folder you will find a file named **Vision_Air_DATE_TIME.txt**.

Configuration

1 The Config Tool is designed as a wizard, but each section can be accessed directly as well.

Click on **[Next]** to go through the different windows.

2 **Vision Air Server** tab:

Table 9

Field	Description
Vision Air Server DNS Name or IP address	Define a network name.
Vision Air TCP port	Defines the port number for Vision Air Routine. This port has to be open (firewall).
Vision Air HTTP port	Alternative port when using a proxy server.
Vision Air HTTPs port	Alternative port when using a proxy server.
ClickOnce port	Used for installing Vision Air Manager via network installer.

3 **SQL Server** tab:

Table 10

Field	Description
Server Address	Address of the server.
Server Instance Name	<server name> <SQL instance name>.
Database	Choose an existing database catalog or define a new name.

4 **Mail** tab: Define e-mail server settings. Fields can be left empty if e-mail service will not be used.

Table 11

Field	Description
Mail server address	Ask your local IT department, e.g. mail.metrohm.com.

Mail server port	Ask your local IT department, e.g. 12.
Mail server user name	Account that sends the automatic mails.
Mail server user password	Password of the account that sends the mails.

5 **License** tab

Select the provided license file and click on **[Next]**.

6 If your server setup has no internet connection, refer to the section Offline Configuration.

Install Service tab: Click on **[Save and Restart Vision Air]** to complete the configuration process.

The server will now start up. After successful installation an icon will be displayed in the Windows task bar.

Table 12

Icon	Description
	Vision Air Server is starting up.
	Vision Air Server started successfully and is ready.

7 If desired, the Windows language can be changed again.

Offline configuration - Create a configuration package

1 Copy the Config Tool.exe from the Vision Air program folder to a computer with internet connection.

2 Launch the Config Tool via command window with the following command: **ConfigTool.exe /Offline**

Config Tool opens.

3 Go to the **Vision Air Server** tab.

4 Enter the server address of the target server.

5 Enter the instance Name of the target instance. This MUST be identical to the name typed in the installer.

6 Fill in the port number as required.

7 Click on **[Save package]** and save the package on the file system.

Offline configuration - Load a configuration package

1 Copy the package file to the computer where Vision Air Server has been installed (without internet connection).

2 Launch Config Tool.

3 Go to the **Current settings** tab.

4 Click on **[Load package]** and select the package on the file system.

5 Go to the **Install Service** tab.

Click on **[Save and Restart Vision Air]** to complete the configuration process.

The server will now start up. After successful installation an icon will be displayed in the Windows task bar.

Table 13

Icon	Description
	Vision Air Server is starting up.
	Vision Air Server started successfully and is ready.

With the installation of the Vision Air Server the Vision Air Manager Network is installed. The Vision Air Manager Network is used to manage all instrument configurations and data that was collected by the clients (Vision Air Routine). Multiple Vision Air Manager Network installations can be installed on different devices. *See Distribution of the Vision Air Manager Network on page 116,* for information on how to distribute the Vision Air Manager Network.

4.2 Vision Air Manager

4.2.1 System requirements

Table 14 Vision Air Manager Network

Operating system	Windows 7 Enterprise SP1 (32 & 64 bit) Windows 10 (32 & 64 bit) Windows Server 2012 / 2016 / 2019 Operating System Language must be English (during installation only)
CPU	2 GHz processor
Memory (RAM)	2 GB
HDD	10 GB free space
Video	SVGA at 1024x768, min. 16 bit color (1280x1024 recommended)
NIC	1x 100 Mbit Ethernet
Firewall ports	2 firewall ports for outgoing communication
Additional software and requirements	.NET 4.8 Framework Extended (included) Crystal Reports 13.01 runtime (included) Internet Explorer 8 or higher

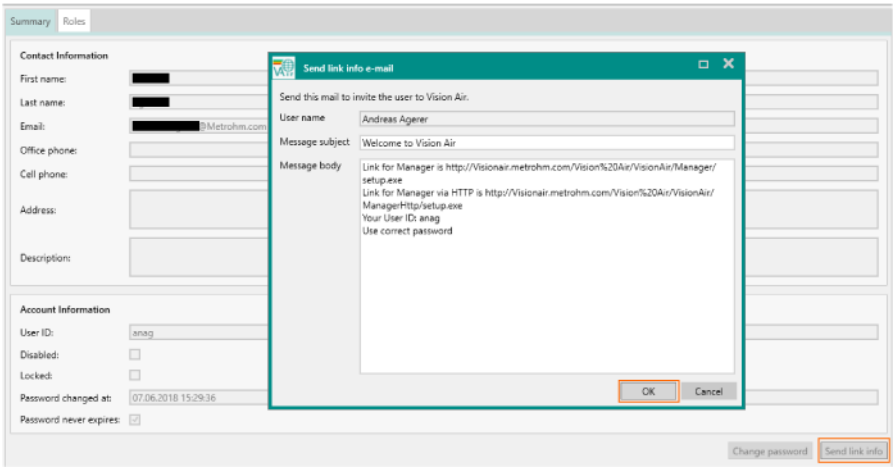
4.2.2 Distribution of the Vision Air Manager Network

The installation of the Vision Air Manager can be distributed in 2 different manners.

Metrohm recommends to distribute the Vision Air Manager Network via e-Mail.

Distribution via e-mail

1. Go to **Users** ▶ **Summary**.
2. Fill in the **Contact Information** and **Account Information**.
3. Click on **Send link info** ▶ **OK** to send an installation link to the new user.



Manual installation

1. To install an additional version of Vision Air Manager Network, go to the folder where the Vision Air instance has been installed to the pc. The additional version of Vision Air Manager Network will be installed in this folder.

   The default folder is "C:\Program Files (x86)\Metrohm\Vision Air Server\VisionAir\VisionAirManager".

2. Copy the installation file "setup.exe" to the PC where you want to install the additional Vision Air Manager Network version.

3. Start the installation file "setup.exe" on the respective PC.

4.3 Vision Air Routine

4.3.1 System requirements

Table 15 Vision Air

Operating system	Windows 7 SP1 (64 bit) Windows 10 (64 bit) Operating System Language must be English (during installation only)
CPU	Dual core 2.8 GHz processor
Memory (RAM)	4 GB
HDD	20 GB free disk space NTFS file system

Display	1024x768 resolution, 32 bit color display
NIC	1x 100 Mbit Ethernet
Drives	DVD drive 1 free USB drive
Additional software and requirements	PDF Reader software Support for IP protocol version 4
Additional system requirements	Since the Vision Air Manager is installed at the same time, the system requirements for Vision Air Manager must be met *(see "System requirements", chapter 4.2.1, page 116)*.

Firewall

Configure all firewalls and VPN clients to allow UDP broadcasts on port 61525 on the interface that is connected to the instrument. Otherwise, Vision Air might be unable to connect to the instrument.

You must be logged in on the PC as an administrator when you install Vision Air.

Power options in the PC should not be set to automatic sleep mode or hibernation. If the PC goes into sleep mode or hibernation mode, it will lose connection to the instrument and a restart of both, Vision Air and the instrument, is then required.

Vision Air supports all XDS instruments and DS2500 instruments.

4.3.2 Pre-installation

Make sure that you are logged into the PC with administrator rights.

Make sure that Windows is up to date, including the Microsoft .Net Framework.

Make sure that no Microsoft SQL Server 2019 is installed.

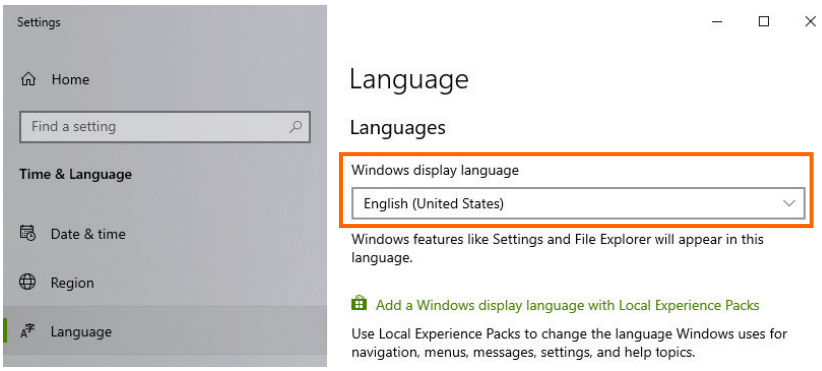
Windows language settings

Set the language to English using the following procedure:

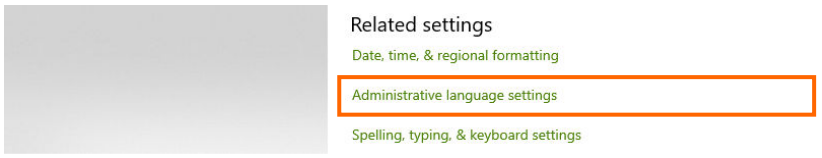
1 Open the Windows language settings, for example, as follows:

- In the Windows search box on the taskbar, type **language settings**.
- Select **Language settings**.

2 Make sure that the Windows display language is **English (United States)** or **English (United Kingdom)**.

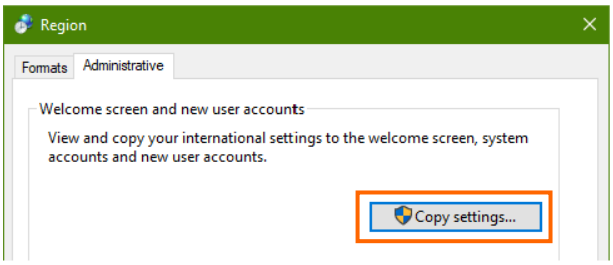


3 Click on **Administrative language settings**.

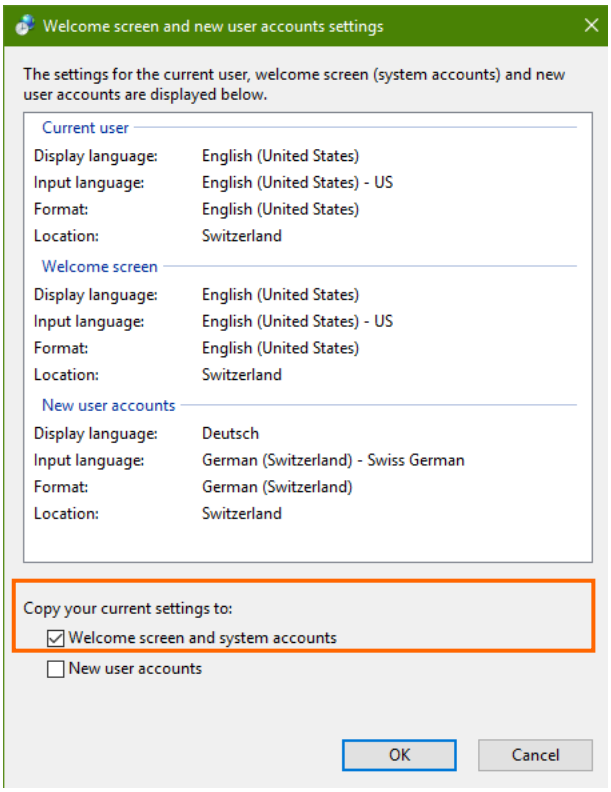


The **Region** window opens.

4 In the tab **Administrative**, click on **Copy settings...**



5 Copy the current settings to the system accounts by activating the check box **Welcome screen and system accounts**.



Confirm with **[OK]**. A Windows restart is required: **[Restart now]**.

4.3.3 Installation of Vision Air

To install Vision Air, shut down all other programs on the computer.

Make sure that you are logged into the PC with administrator rights.

There are 3 different installers:

- Installer for XDS instruments
- Installer for DS2500 Solid Analyzer
- Installer for DS2500 Liquid Analyzer

Choose the installer according to the instrument you are connecting.

Proceed as follows:

1. Insert the installation medium with the Vision Air installer and double-click on the installer for DS2500 Solid Analyzer, DS2500 Liquid Analyzer or XDS instruments.

2. Before Vision Air is installed, the program checks whether there are any necessary software components missing on the PC.

The first time Vision Air is installed on a PC, all these software components are installed one after the other. Follow the on-screen instructions and click on **[OK]** when prompted. When re-installing Vision Air at a later stage (for example when upgrading to later versions), most of these components needed are already installed and these steps are skipped automatically during the installation.

3 Click on **[Install]**.

4 Select the version of Vision Air you want to install according to the following table.

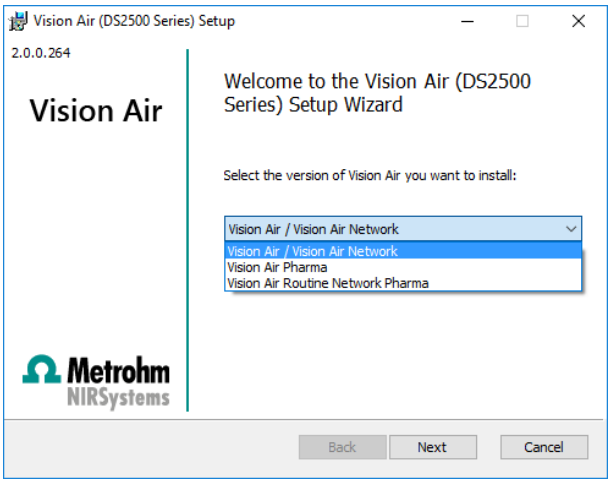
<table>
<tr><th colspan="3">Regulated environment?</th></tr>
<tr><td colspan="2">Yes</td><td rowspan="3">No</td></tr>
<tr><th colspan="2">Client/server setup?</th></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>Vision Air Routine Network Pharma</td><td>Vision Air Pharma</td><td>Vision Air / Vision Air Network</td></tr>
<tr><td>A client installation with pharma features.

Installation of Vision Air Routine.</td><td>A local installation with pharma features.

Installation of Vision Air Routine and Vision Air Manager Local.</td><td>A local or client version without pharma features.

Installation of Vision Air Routine and Vision Air Manager Local.</td></tr>
<tr><td>The Vision Air Server and the Vision Air Manager Network must be installed separetly. Refer to the Vision Air Network and Server Pharma tutorial (8.105.8038EN).</td><td>Refer to the Vision Air Local Pharma tutorial (8.105.8034EN).</td><td>For the local version, refer to the Vision Air Local tutorial (8.105.8032EN).

For the client/server version, the Vision Air Server and the Vision Air Manager Network must be installed separately. Refer to the Vision Air Network and Server tutorial (8.105.8036EN).</td></tr>
</table>



After selecting the version, click on **[Next]**.

A license file is required later to activate the software after installation.

"Vision Air Complete" is a bundle version of Vision and Vision Air; Vision needs to be installed with the separate installer.

5 Read and accept the license agreement. Click on **[Next]**.

6 For the DS2500 series, there is the option to install Vision Air with an instrument simulator. Select **[Install Vision Air for use with a physical instrument]** and click on **[Install]**.

The selection **Install Vision Air with an instrument simulator** is only for software demonstration and training purposes and should not be installed on customer PCs.

7 Click on **[Install]** to begin the the installation.

8 A text confirms the successful installation. Click on **[Finish]**.

Installation log files can be found in the temp folder of your operating system. Open Windows Explorer and type in **[%temp%]**. In this folder you will find a file named 'Vision_Air_DATE_TIME.txt'.

9 After the installation, 2 new icons are created on the desktop.

- Vision Air Routine for access to the routine application part of Vision Air.
- Vision Air Manager for access to the managing part of Vision Air.

10 If desired, the Windows language can be changed again.

4.3.4 Installation of the Unscrambler Prediction Classification Engine

The Unscrambler Prediction Classification Engine is a plug-in that allows to use the third-party software Unscrambler in Vision Air.

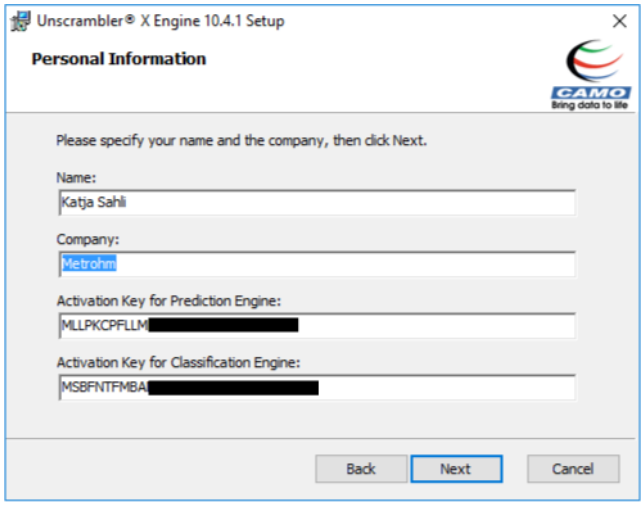
Proceed as follows to install the Unscrambler Prediction Classification Engine:

Vision Air must already be installed on your computer.

1. Double-click on the file **setup.exe**.
2. Click on **[Execute]**.

   The installation wizard opens.
3. Follow the instructions of the installation wizard.
4. In the **Personal Information** window, enter the following information.

   - Name
   - Company
   - Activation Key for Prediction Engine
   - Activation Key for Classification Engine



   The scope of delivery for Vision Air includes a license CD. Find your activation keys in the **License Certificate.pdf** file on the license CD.

   The wizard continues.
5. After installing the Unscrambler Prediction Classification Engine, go to **C ► CAMO Software ► Unscrambler X Engine 10.4.1**.

   Copy the following files:

- camoengine.dll
- olucx.sys
- olupx.sys

6 Go to **C ▶ Program Files (x86) ▶ Metrohm ▶ Vision Air (DS2500 Series) or Vision Air (XDS Series)**. Depending on your installation, you have either the folder Vision Air (DS2500 Series), Vision Air (XDS Series) or both.

Insert the files that you copied in step 5 in your Vision Air folder.

The installation is complete.

5 Start-up

5.1 Configuration

6 configuration steps need to be carried out before using Vision Air Network with the Vision Air Server for quality control.

1. Calibration of the instrument.
2. Connecting the instrument to Vision Air Routine.
3. Register the user and instruments to the Vision Air Server.
4. Import of Vision Air licenses.
5. Importing or creating operating procedures.
6. Adding operating procedures to an instrument group and updating instruments.

5.2 Calibration of the instrument

XDS instruments

Make sure your instrument is calibrated according to *Vision Tutorial – Instrument Calibration (81058054EN)*. Use either Vision or Vision Air Setup for the instrument calibration. Vision Air Setup can be found on the Vision Air installation DVD and needs to be installed manually.

DS2500 instruments

Calibrate the instrument with Vision Air instrument calibration.

To calibrate the DS2500 Solid Analyzer, see *Calibrating the instrument in Vision Air Routine, page 79*.

To calibrate the DS2500 Liquid Analyzer, see *Calibrating the instrument in Vision Air Routine, page 83*.

Before starting the instrument calibration, connect the instrument to Vision Air Routine *(see "Connecting the instrument to Vision Air Routine", chapter 5.3, page 126)*.

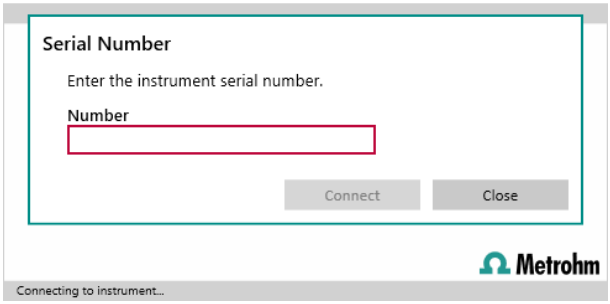
5.3 Connecting the instrument to Vision Air Routine

On first start-up of Vision Air Routine there are some specific tasks to establish a connection to the instrument.

Start-up Vision Air Routine

1 After installation, double-click on Vision Air Routine program icon.

2 Enter the serial number of the analyzer. The serial number can be found on the type plate of your analyzer. For the Metrohm DS2500 Analyzer, it contains of 8 digits, starting with “917xxxxx”; for the XDS Analyzers, it contains of 8 digits of the format “xxxx-xxxx”.



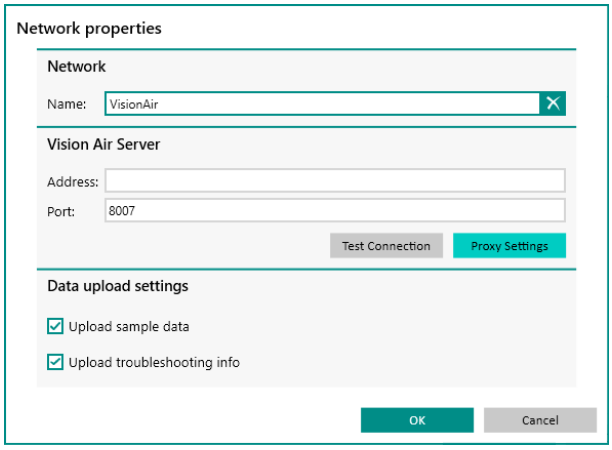
Connect to Vision Air Server

1 Go to section **Tools**.

2 Click on **[Settings]** and make sure the **Vision Air Sync** tab is opened.

3 Click on **[Edit]** to enter the network properties dialog window.

4



Fill in the needed server details and click **[Test Connection]**.

If you do not know your server details, you will find the necessary data within the Config Tool of Vision Air Server.

A window will open and confirm the successful connection.

5 Click on **[OK]** to finish the server configuration.

Synchronize with Vision Air Server

A connection to Vision Air Server must be configured first.

1 Go to section **Tools**.

2 Click on **[Vision Air Synchronization]**.

3 Click on **[Synchronize]**.

A successful synchronization is confirmed with a dialog window.

An information is displayed. It says that the registration in the Vision Air Manager Network is required.

5.4 Register the user and instruments to the Vision Air Server

Create a network

1 Double-click on the Vision Air Manager Network program icon.

2 Enter your ID and password to log in.

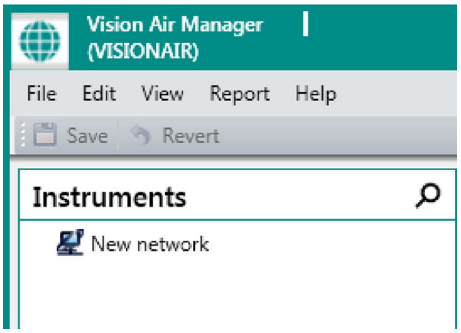
For the first login, use the following user ID and password:

User Name: admin
Password: a

3 Enter a new password after the first login.

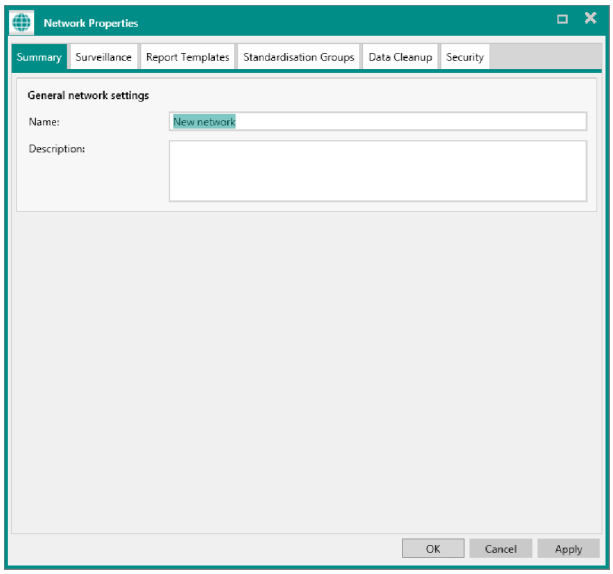
4 Go to **Instruments** section.

5 Right-click anyhwere into the structure window and click on **[New Network]**.



A new network has been created.

6 Right-click on the newly created network and click on **[Properties]**.



7 Enter the name and a description of the network in the **Summary** tab.

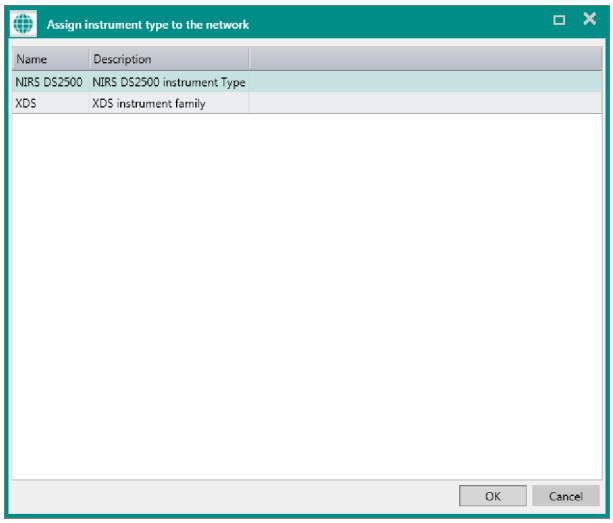
8 Confirm the entries with **[OK]**.

Assign instrument types

1 Go to **Instruments** section.

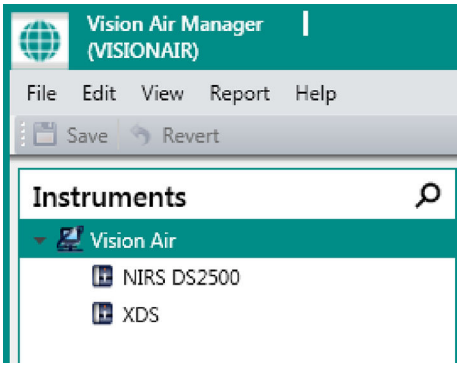
2 Right-click on the desired network and click on **[Assign instrument types...]**.

A context menu opens.



3 Select the desired instrument type and confirm with **[OK]**.

Multiple instruments types can be selected by keeping the **[Ctrl]** key pressed down.



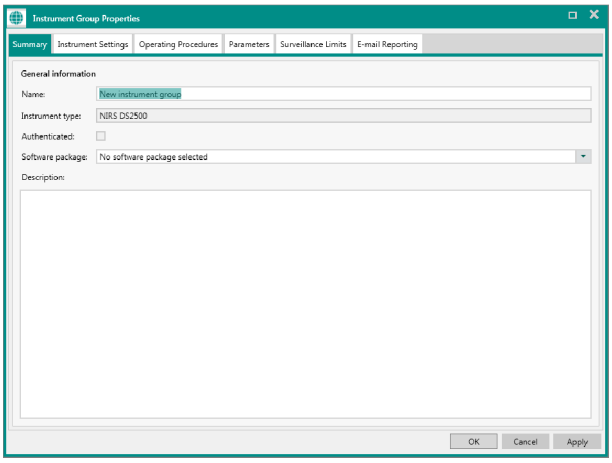
The instrument types are displayed in the structure window as follows:

Create an instrument group

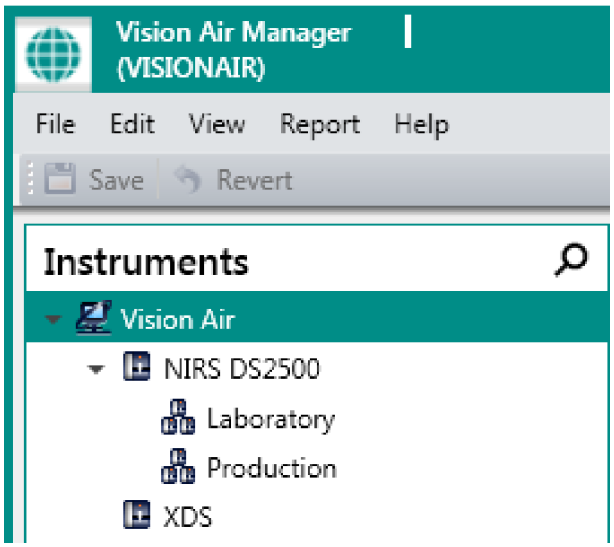
1 Go to **Instruments** section.

2 Right-click on an instrument type and click on **[New group]**.

A context menu opens.



3 Enter a name under **Name** on the **Summary** tab and confirm with **[OK]**.

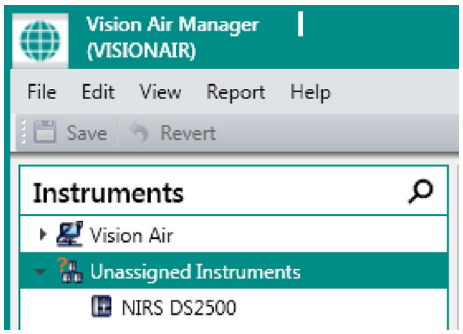


The instrument groups are displayed in the structure window.

Assign an instrument

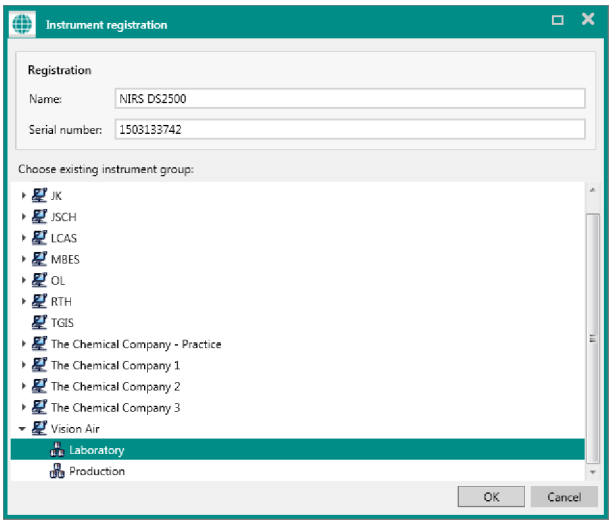
The instrument must be connected to the network in Vision Air Routine *(see "Connecting the instrument to Vision Air Routine", chapter 5.3, page 126)*.

1 Go to **Instruments** section.

2 

Open the entry **Unassigned instruments** in the structure window.

3 Right-click on an unassigned instrument in the data window and click on **[Register...]**.



4 Select the desired network and instrument group and confirm with **[OK]**.

The new instrument is added to the selected instrument group.

5.5 Import of Vision Air licenses

To conduct the next steps, Vision Air Routine needs a one time connection with the instrument.

To add a license to an instrument, proceed as follows:

1 Double-click on the Vision Air Manager Network program icon.

2 Go to the **Instruments** tab in the navigation window.

3 Select the instrument you want to add a license to.

4 Select the **Licenses** tab in the work window.

5 Click on **[Import]**. Choose the file that was provided with the Vision Air License CD. Click on **[OK]**.

6 Click on **[Save]** in the toolbar.

5.6 Operating procedures

After setting up the system, operating procedures need to be defined to conduct measurements in Vision Air Routine.

An operating procedure consists of 1 or several prediction models, a method and optional user-defined fields. Operating procedures are selectable in Vision Air Routine to conduct an analysis.

Prediction models are algorithms that correlate NIR spectra to properties of the sample, for example, water concentration. Each prediction model is linked to 1 parameter profile.

Parameter profiles define the parameter to be analyzed in accordance with the linked prediction model. For example, a parameter profile for a prediction model to quantify the water content is water in %.

Methods describe the way how a measurement is conducted, for example, number of repetitions or temperature.

The following chart illustrates the structure and the workflow to create full functional operating procedures. It is explained in detail in the following chapters:

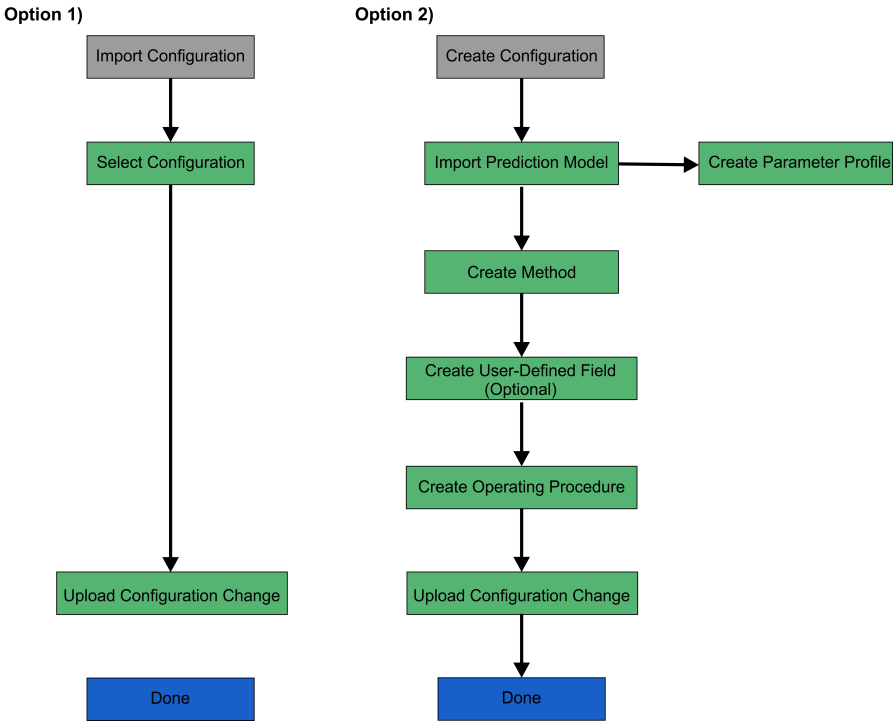


Figure 4 Workflow description for operating procedures

5.7 Importing a complete configuration

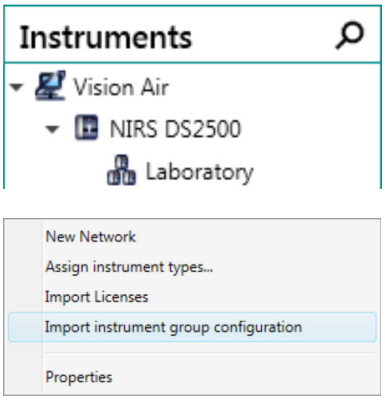
Complete operating procedures that were created in Vision can be imported into Vision Air Manager. A complete configuration from a different Vision Air installation that includes all operating procedures of the system can also be imported.

To import a complete configuration of operating procedures, proceed as follows:

Import instrument group configuration

1 Select **Instruments** tab in the navigation window.

2 Right-click on a network ( ) .



3 Select the .xml-file in the dialog window and click on **[Open]**.

5.8 Creating a complete configuration of operating procedures

Carry out the following actions to create a complete configuration of operating procedures.

1. Import prediction models *(see "Importing prediction models", chapter 5.8.1, page 135)*.
2. Create methods *(see "Creating methods", chapter 5.8.2, page 137)*.
3. Create user-defined fields *(see "Creating user-defined fields", chapter 5.8.3, page 138)*.
4. Create and configure operating procedures *(see "Creating and configuring operating procedures", chapter 5.8.4, page 139)*.

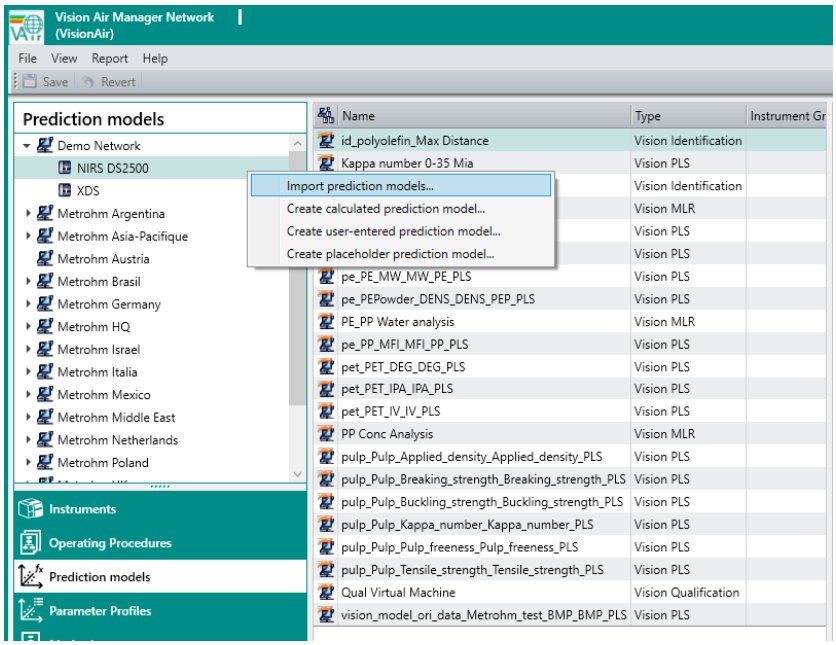
5.8.1 Importing prediction models

Prediction models that were created in Vision, The Unscrambler or PLS_Toolbox can be imported into Vision Air Manager as follows:

1 Click on **[Prediction models]** in the navigation window.

2 Select the instrument type where you want to add a prediction model.

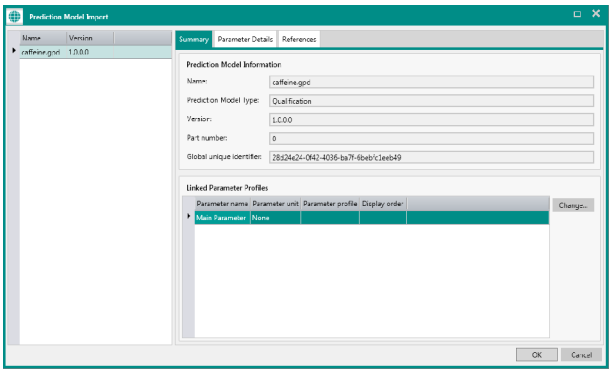
3 Right-click in the data window on the instrument type (NIRS DS2500 Liquid, NIRS DS2500 Solid or XDS) and select **[Import prediction models]**.



4 Select prediction model(s) to import and click on **[OK]**.

The **Import prediction models** window opens.

5 Link the imported prediction(s) with parameter profile(s) by clicking on **[Change]**.



The **Link parameter profile to parameter** window opens.

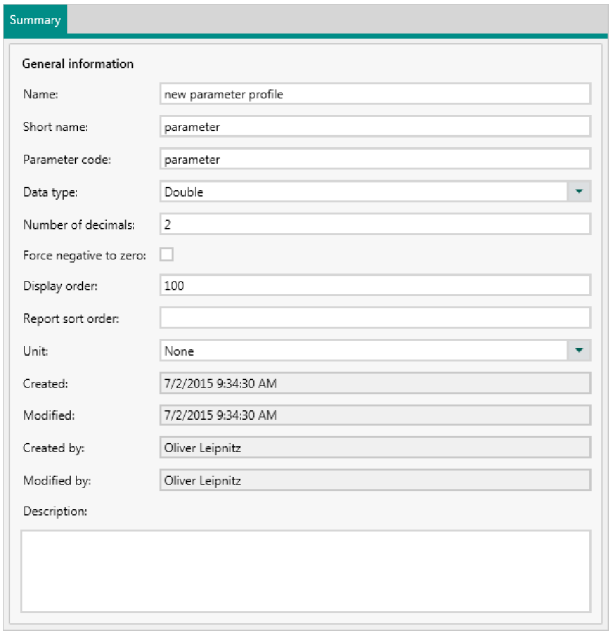
6 Select a parameter profile from the list and confirm with **[OK]** or create a new parameter profile by clicking on **[New]**.

If you selected a parameter profile, the import is complete.

If you clicked on **[New]**, proceed with step 7.

7 Only perform this step if you want to create a new parameter profile.

Define a new parameter profile name, short name, parameter code and unit. The unit can only be defined with quantitative prediction models.



Go to the **Prediction models** section for a detailed description of the individual functions *(see "Prediction models section", chapter 3.1.6, page 28)*.

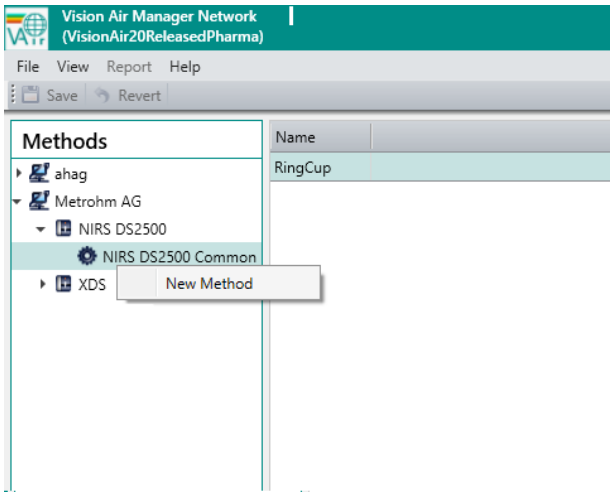
Go to the **Parameter profiles** section for a detailed description of the individual functions *(see "Parameter profiles section", chapter 3.1.7, page 31)*.

5.8.2 Creating methods

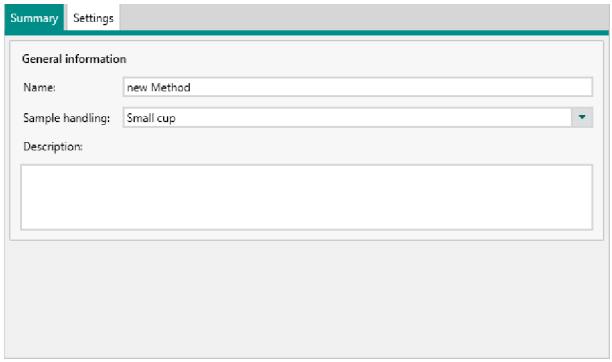
To create a new method, proceed as follows:

1. Go to the **Methods** section.

2. Select a network. Open the drop-down menu of the instrument type where you want to add the method. Right-click on the gear icon next to the instrument type to which you want to add the method.



3. In the **Summary** tab, enter the name and optionally a description.



4. Choose a suitable sample vessel that you want to use for your analysis.

5. Save the settings with the **[Save]** button in the toolbar.

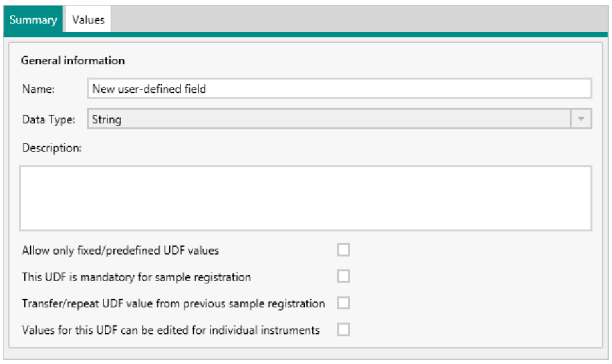
Additional settings that are available for methods are described in the methods section *(see "Methods section", chapter 3.1.8, page 33)*.

5.8.3 Creating user-defined fields

User-defined fields provide additional information on samples and can be added optionally.

To create user-defined fields, proceed as follows:

1. Go to the **User-defined fields** section.
2. Right-click in the structure window on the network and select **New user-defined field**.

   The new user-defined field is displayed in the data window.
3. 

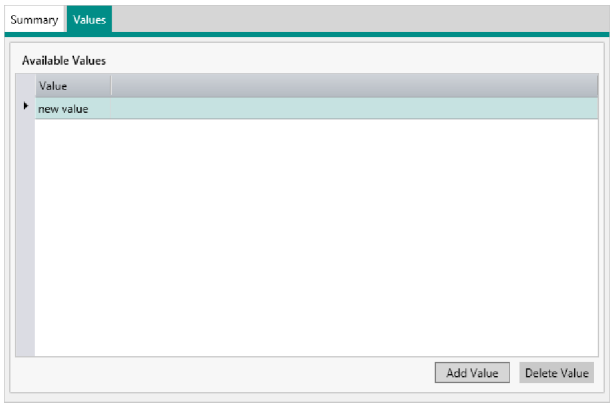
   Switch to the **Summary** tab and enter the name and a description.

   The following settings are available:

   When activating the check box **Allow only fixed/predefined UDF values** (defined on the **Values** tab), only predefined values can be selected during sample registration in Vision Air Routine.

   If the check box **This UDF is mandatory for sample registration** is checked, the user is not allowed to do a sample registration without filling out this user-defined field.

   By checking **Transfer/repeat UDF value from previous sample registration**, the last user-defined field entry that was made during sample registration in Vision Air Routine is reselected automatically for the next sample registration. The user-defined field entry can always be changed.
4. Switch to the **Values** tab.
5. Click on **[Add value]**.



The new value is displayed in the work window.

6 Enter a name for the new value and save it with the **[Save]** button.

Further values can be added or removed at any time.

5.8.4 Creating and configuring operating procedures

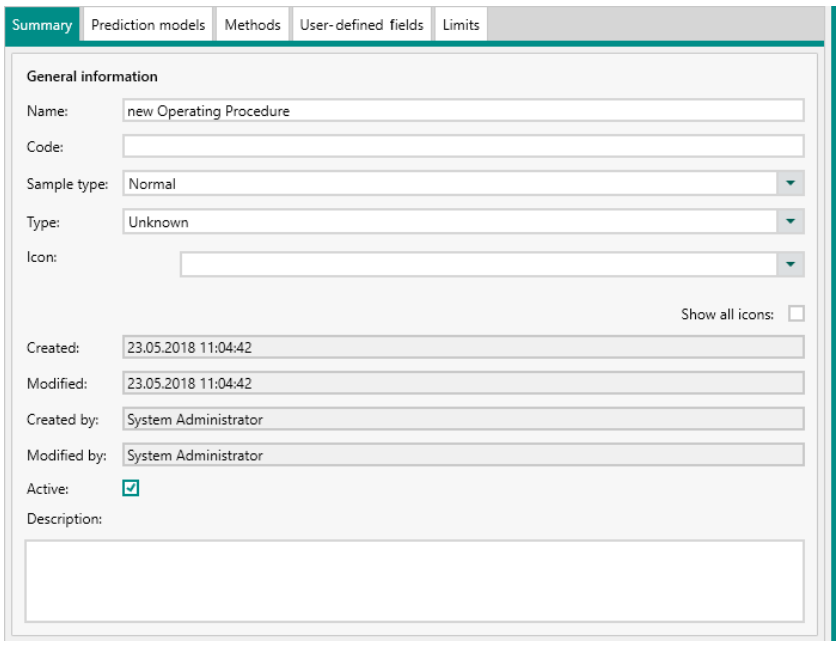
To create and configure an operating procedure, proceed as follows:

1 Click on **[Operating procedures]** in the navigation window.

2 Right-click in the structure window and click on **[New operating procedure]**.

The new operating procedure is created and displayed in the data window.

3

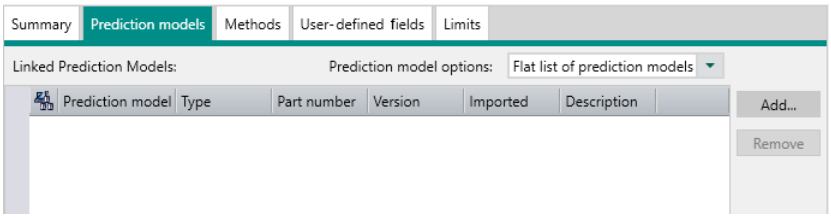


In the **Summary** tab, define the name of the operating procedure.

4 Link prediction models, methods and user-defined fields (optional) to the operating procedure. To do so, proceed with the following procedures.

To link prediction models, proceed as follows:

1



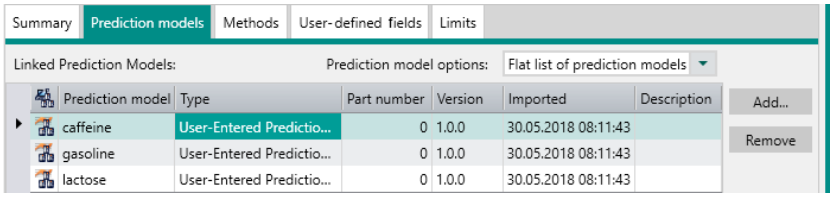
Switch to the **Prediction models** tab.

2 Click on **[Add...]**.

The **Link prediction model to operating procedure** window opens.

3 Select the desired prediction models and assign them with **[OK]**.

Multiple items can be selected by keeping the **[CTRL]** key pressed down.

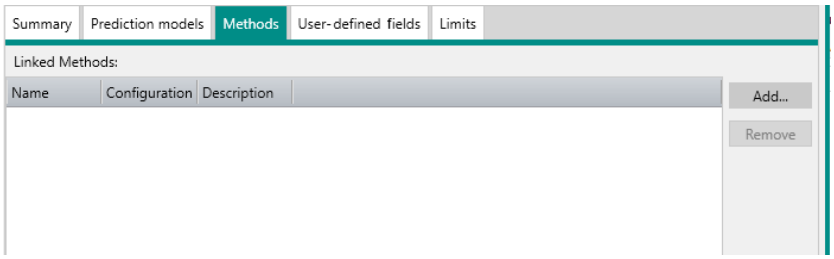


The prediction models are displayed in the work window.

4 Save the settings with the **[Save]** button.

To link methods, proceed as follows:

1

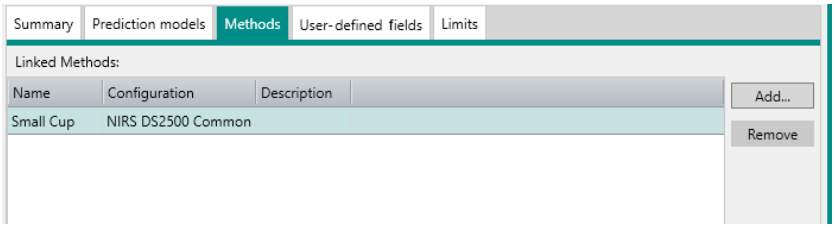


Switch to the **Methods** tab.

2 Click on **[Add...]**.

The **Link methods to operating procedure** window opens.

3 Select the desired method and link it with **[OK]**.



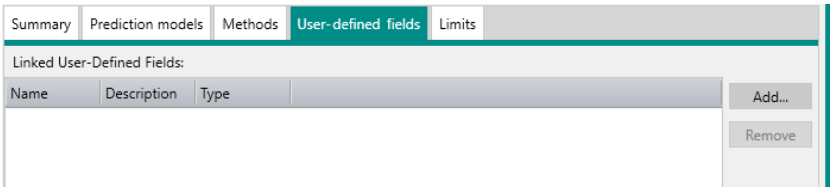
The method is displayed in the work window.

4 Save the settings with the **[Save]** button.

Additional settings that are available for operating procedures are described in the operating procedures section *(see "Operating procedures section", chapter 3.1.5, page 24)*.

Linking user-defined fields is optional.

To link user-defined fields, proceed as follows:

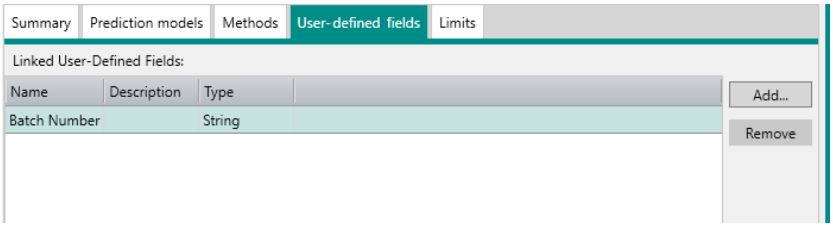
1 

Switch to the **User-defined fields** tab.

2 Click on **[Add...]**.

The **Link user-defined field to operating procedure** window opens.

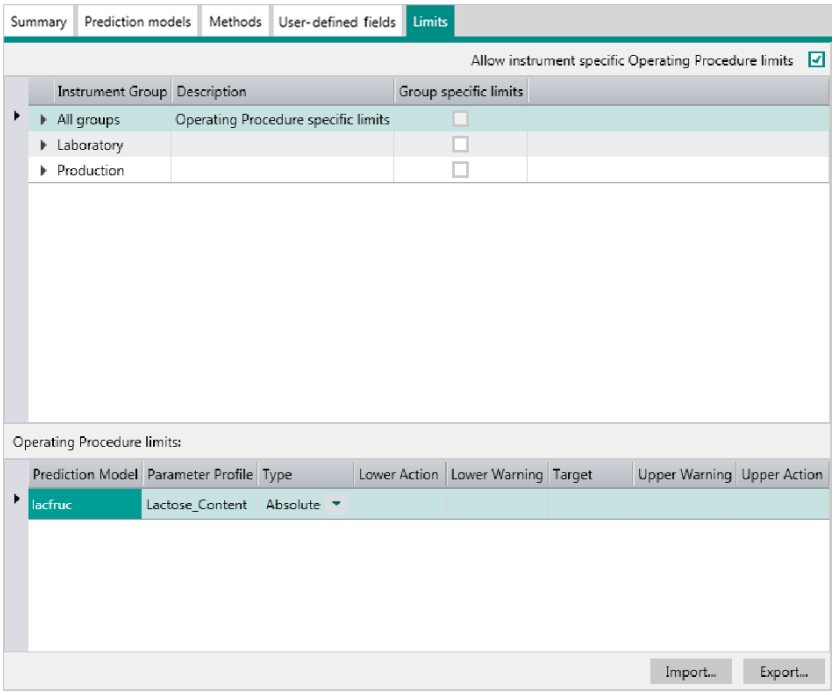
3 Select a user-defined field and link it with **[OK]**.



The user-defined field is displayed in the work window.

To define limits for operating procedures, proceed as follows:

1 Open the **Operating procedures** section.

2 

Switch to the **Limits** tab.

3 Select the desired operating procedure.

4 In the table in the **Limits** tab, fill in the following information:

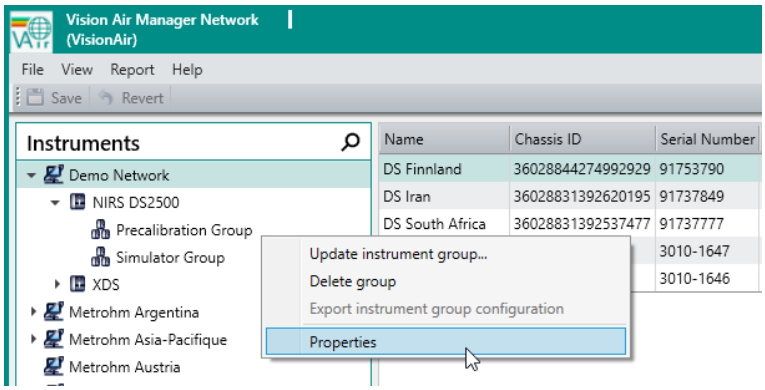
- **Lower intervention**: Lower intervention limit
- **Lower warning**: Lower warning limit
- **Target**: Target value
- **Upper warning**: Upper warning limit
- **Upper intervention**: Upper intervention limit

5 Save the settings with the **[Save]** button.

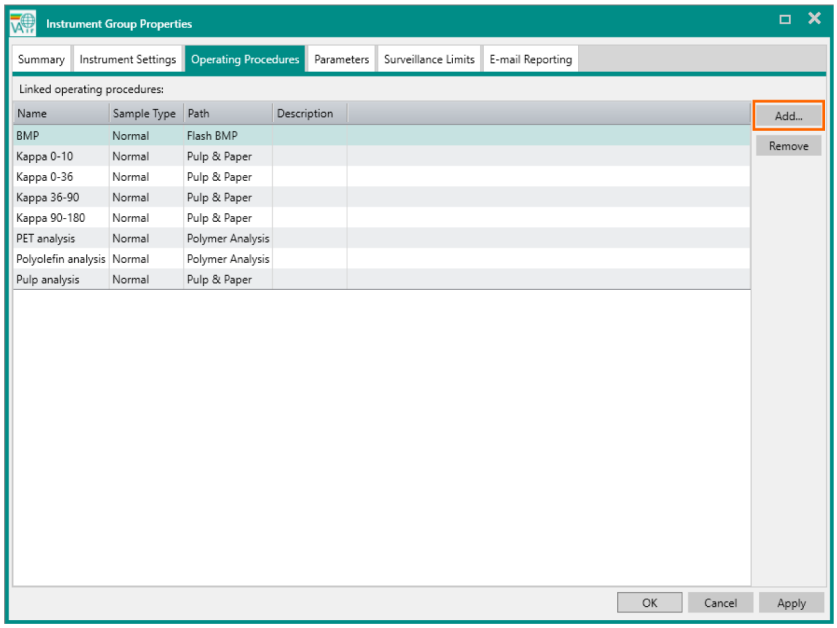
5.8.5 Adding operating procedures to an instrument group and updating instruments

1 Open the **Instruments** section.

2 Right-click on the instrument group and select **Properties**.



3 Go to the **Operating procedures** tab. Click on **[Add]**.



Select the operating procedures that should be added to the selected instrument group. Confirm with **[OK]**.

Operating procedures can also be linked with individual instruments *(see "Operating procedures section", chapter 3.1.5, page 24)*.

4 Right-click on the instrument group. Select **Update instrument group...**.

5 Select the instruments which should be updated.

Click on **[OK]**.

The status update session is displayed in the **Configuration Change** section *(see "Configuration change section", chapter 3.1.11, page 38)*.

After synchronizing in Vision Air Routine, operating procedures are available in Vision Air Routine. The status for the configuration change has changed to **completed**.

6 Operation and control

6.1 Data acquisition

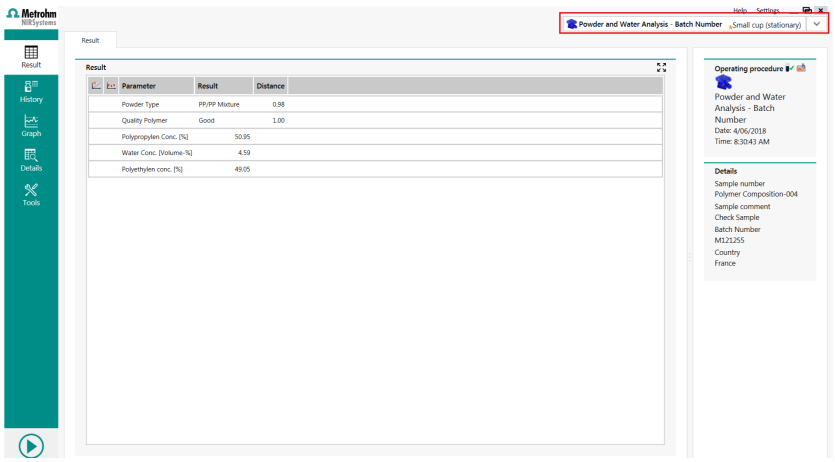
6.1.1 Selecting an operating procedure

To select an operating procedure, proceed as follows:

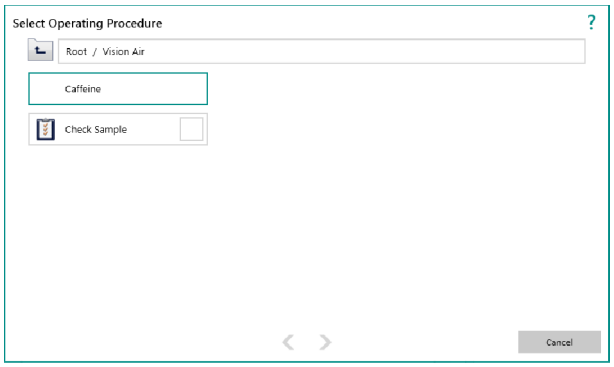
1. Open Vision Air Routine.

2. Ensure that you use the most recent operating procedure. To synchronize with the server, go to the **Tools** section and click on **Vision Air Synchronization**.

3. Click on the **[Operating procedure]** drop-down list.



4. Select the desired operating procedure.



The button is available if operating procedure groups were defined in Vision Air Manager.

6.1.2 Analyzing a sample

To analyze a sample, proceed as follows:

1 Click on the **[Start]** button.

The sample is analyzed. The progress indicator shows the progress of the analysis.

If sample registration information needs to be entered, a window opens that asks for the missing information.

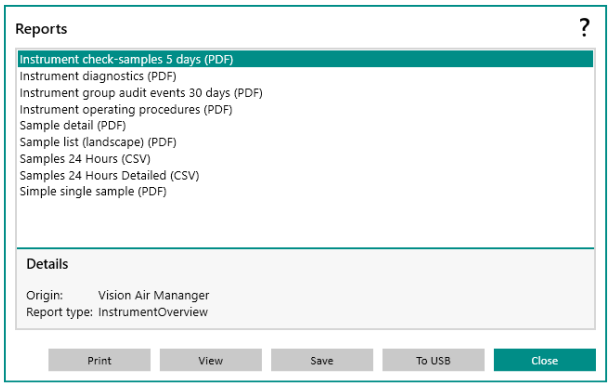
If the **Tools** section is selected, the **[Start]** button is not active.

6.2 Creating reports in Vision Air Routine

To export and print reports in Vision Air Routine, proceed as follows:

1 Go to the **Tools** section.

2 Click on the menu item **[Reports]**.



The **Reports** window opens.

3 Select the desired report type and click on 1 of the following buttons:

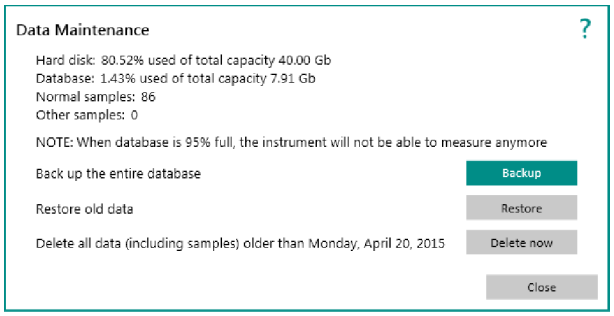
- **[Print]**: Prints the report.
- **[View]**: Displays the report.
- **[Save]**: Saves the report.
- **[To USB]**: Saves the report to a USB device.
- **[Close]**: Closes the window.

6.3 Data maintenance

Data can be backed up, restored and deleted. In addition, the capacity of the hard disk and the database as well as the total number of measured samples can be displayed.

To back up data, proceed as follows:

1 Click on **[Data maintenance]**.



The top of the dialog box displays the system memory status.

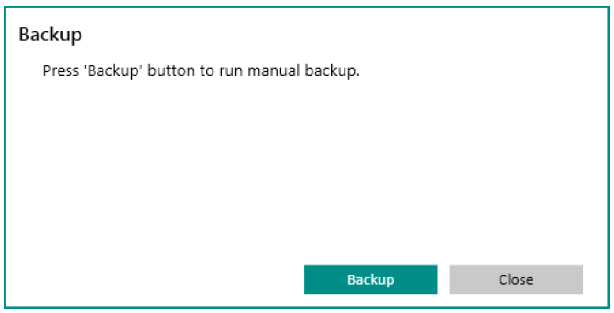
Hard disk: Memory size left for all applications on the PC.

Database: Memory size left in the database for Vision Air data.

Normal samples: Number of analyzed samples.

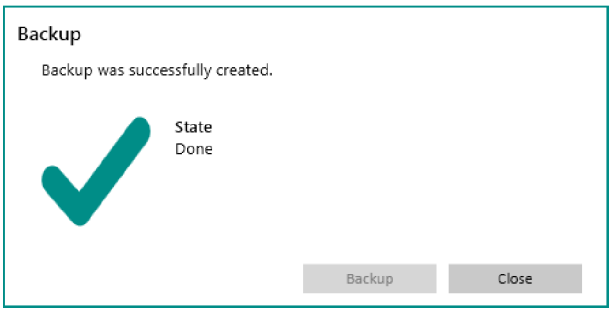
Other samples: Number of analyzed samples that do not belong to the normal type e.g. check sample, check sample operating procedures.

2 Click on **[Backup]**.



The **Backup** window opens.

3 Click on **[Backup]**.



The backup is created.

4 Click on **[Close]** after the backup has been completed.

The storage location is defined under **Tools ▶ Settings ▶ Export** in Vision Air Routine *(see "Tools section", chapter 3.2.6, page 59)*.

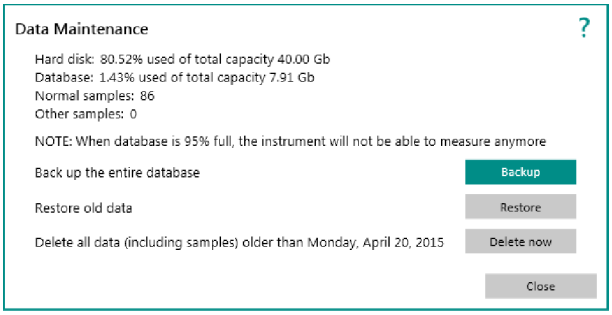
Backup files can be restored in Vision Air. Be aware that database restoration overwrites the existing database. Be careful not to overwrite valuable information.

To restore data, proceed as follows:

Preconditions:

- You are logged in on the PC as an administrator.
- Windows User Account Control (UAC) is turned off.

1 Click on **[Data maintenance]**.



2 Click on **[Restore]**.

3 Click on **[Browse]** and select the backup file that should be restored.

4 Click on **[Data restore]** to open the backup file that should be restored.

If a power loss occures during database restoration, proceed as follows:

Preconditions:

- You are logged in on the PC as an administrator.
- Windows User Account Control (UAC) is turned off.

1 Open the installation folder. This is typically **C:** ▶ **Program Files (x86)** ▶ **Metrohm** ▶ **<instrument name>**.

2 Start **ServiceRoutinesExecutor**.

The **Restore** dialog window opens.

3 In the **Restore** dialog window, click on **[Browse]** to select the database backup.

4 Click on **Restore** to start database restoring.

6.4 Data management

6.4.1 Surveillance

To monitor sample data, proceed as follows:

1 Go to the **Surveillance** section in Vision Air Manager or Vision Air Manager Network.

2 Go to the **Samples** tab.

3 Define the filter options, e.g. only show samples that were measured with a specific operating procedure.

4 Define the time period of the data.

5 Click on **[Filter]**.

6 If needed, right-click on a sample and click on **[Details...]** to display detailed sample data.

To monitor diagnostics, proceed as follows:

1 Go to the **Surveillance** section in Vision Air Manager.

2 Go to the **Diagnostics** tab.

3 Click on **[Filter]**.

4 Double-click on a start-up test.

5 Select the wavelength test. Click on data to view the results.

To monitor instrument events and user related events (login, logout, locking of users etc.), proceed as follows:

1 Go to the **Surveillance** section in Vision Air Manager.

2 Go to the **Events** tab.

3 Define the filter options, e.g. only show errors.

4 Define the time period of the data.

5 Click on **[Filter]**.

6.4.2 Sample lists

To create sample lists and sample list groups, proceed as follows:

1 Select the **Sample lists** section in the navigation window.

2 Right-click in the structure window and select **[New sample list group]**.

3 Right-click on the new sample list group and click on **[Sample list]** to create a sample list.

4 Select the **Samples** tab and add filter settings to filter measurements accordingly.

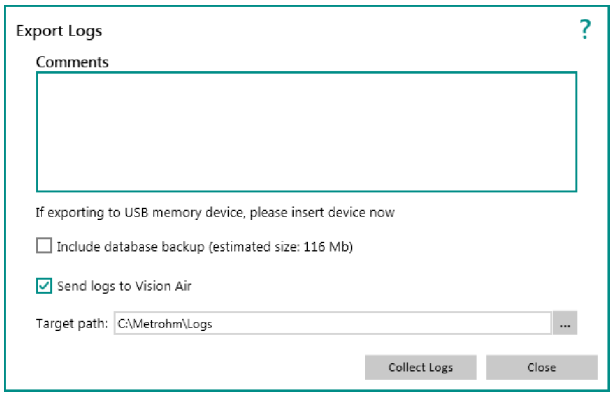
Multiple sample lists can be created with different filter settings to conveniently manage large data sets and track conducted measurements.
Sample lists are also used for slope/intercept correction *(see "Slope/intercept calculations", chapter 3.3.8, page 75)*.

7 Malfunctions and troubleshooting

7.1 Exporting log files

To export log files, proceed as follows:

1. Open Vision Air Routine.
2. Go to the **Tools** section.
3. Click on the **[Export logs]** menu item.



The **Export logs** window opens.

4. If desired, enter comments regarding the export in the **Comments** field and select the option **Include database backup**. The **Send logs to Vision Air** option is only needed in a client/server setup. Please refer to the tutorials for Vision Air Network Tutorials for details.
5. Specify the target path and click on **[Collect logs]**.

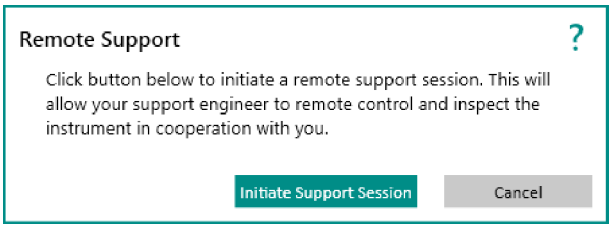
7.2 Remote support

With the **Remote support** functionality, a remote access can be set up with an external program. This remote access enables Metrohm employees to access the instrument in case of an error or for maintenance.

To use this functionality, a full version of the TeamViewer software needs to be installed on the computer.

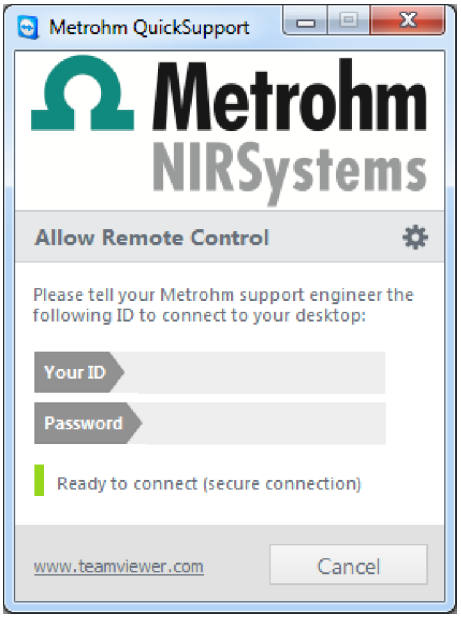
To set up the remote support, proceed as follows:

1. Open Vision Air Routine.
2. Go to the **Tools** section.
3. Click on the **[Remote support]** menu item.



The **Remote Support** window opens.

4. Click on **[Initiate support session]**.



The **TeamViewer** software is started and the **Metrohm QuickSupport** window opens.

5 Tell the Metrohm employee the displayed ID and the password.

The Metrohm employee can now access your computer and will perform the remote support.

7.3 Settings for database and SQL Server

Move database and security

1 If you have an existing database, then make a backup. Restore that backup on the target SQL Server instance.

2 Grant SQL Server "db_owner" rights for the user representing machine where Vision Air Service is running.

3 Set the Vision Air database as default 1 for the user mentioned in step 2.

Redirect Vision Air to use another SQL Server (on an already installed system)

1 Stop Vision Air service.

2 Edit hosting.exe.config, set connectionString property to the correct server.

3 Move the database (either backup and restore or detach, move and attach).

4 Start Vision Air Service again.

If Vision Air fails to start, then check the logfiles located in Vision Air installation folder, subfolder logs (like **C:\Program Files (x86)\Metrohm\Vision Air\VISIONAIR\VISIONAIR\Logs**). Start with the newest hosting.exe-??.e2e and possibly also SchemaManagement-??.e2e.

If you are trying to run an old (older than 1.0) Vision Air host with a remote database, you need to copy the CLR assembly to the PC where SQL Server is installed (see the next paragraph).

If you have problems with MSDTC (it is mentioned in exception text in server logs), try enabling **Allow Inbound** and **Allow Outbound** on

both, SQL and application servers *(see "Remote SQL Server configuration", chapter 4.1.4, page 97)*.

7.4 Troubleshooting

The following table helps with troubleshooting for Vision Air Routine and Vision Air Manager Local.

Problem	Cause	Remedy
Vision Air does not start.	On the Vision Air Routine PC, the Windows language is not set to English.	Set the Windows language to English *(see "Pre-installation", chapter 4.3.2, page 118)*.
	Vision Air Services are not started after restarting the PC.	Restart the Vision Air Services manually, e.g. as follows: In the Windows search box on the taskbar, type **services**, and then select **Services**. 2 services must be started, the respective names may begin with: ▪ Vision Air (XDS Series)… ▪ Vision Air (DS2500 Series)… ▪ Vision Air (DS2500 L Series)… If the **Start** and **Stop** commands are grayed out, proceed as follows: ▪ Disable the **Vision Air** services via **context menu** ► **Properties**. ▪ Restart the computer. ▪ Backup the SQL database. ▪ Uninstall Vision Air. ▪ Uninstall the Microsoft SQL Server. ▪ Log on to the PC with full administrator rights and install Vision Air.
	During installation, no database (**XDS**, **DS2500** or **DS2500L**) was created in the SQL Server Express instance.	Make sure that **no** SQL Server 2019 is on the PC. Make sure you have full administrator rights during the installation.

Problem	Cause	Remedy
	If a turkish operating system is used, the collation settings defined during the SQL Server installation will not fit the requirements.	2 remedies are available: ▪ Uninstall the Microsoft SQL Server. Install the same Microsoft SQL Server version manually and change the collation settings to English during the installation process. ▪ Alternatively, change the Windows language to English *(see "Pre-installation", chapter 4.3.2, page 118)*.
It takes a long time to update the instrument settings during the startup of Vision Air Routine.	VPN client	Uninstall CheckPoint EndPointSecurity that is part of the VPN client.

8 Accessories

Up-to-date information on the scope of delivery and on optional accessories can be found on the Metrohm website. Download this information as follows:

Downloading the accessories list

1. Go to *https://www.metrohm.com*.
2. Enter the article number of the product (e.g. **2.1001.0010**) into the search field.

   The search result is displayed.
3. Click on the product.

   Detailed information regarding the product is shown on various tabs.
4. On the **Included parts** tab, click the link to download the PDF.

   The PDF file with the accessories data is loaded.

Metrohm recommends downloading the accessories list from the Internet and keeping it for reference purposes.