Technical Documentation and Help

Version 8.30

Mödling, 13.03.2026

SCHUHFRIED GmbH, Hyrtlstraße 45, 2340 Mödling, Austria
Tel. +43/2236/42315-0 | info@schuhfried.com | www.schuhfried.com
Residence: Mödling, FN 104661p
Regional court: Wr. Neustadt, UID No. ATU 19273809

SCHUHFRIED
psychometrics for you

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1 INFORMATION

This document is the print version of the online technical documentation and help for the Vienna Test System (https://help.schuhfried.com/) from SCHUHFRIED. Please note that the technical documentation and help is versioned and only valid for the VTS version listed on the title page.

The manual for the SFS Test Solutions can be downloaded separately on the SFS Test Solutions page. To do this please go to the online version of the technical documentation and help and navigate to *SFS Test Solutions*.

2 THE VIENNA TEST SYSTEM

The **Vienna Test System (VTS)** is SCHUHFRIED's software solution for digital psychological assessment. It offers a wide selection of tests, languages and norms, as well as flexible options for test presentation and scoring. The VTS is the result of 77 years of experience in computer-based psychological assessment. It covers a wide range of modern methods for personality and ability assessment, which are regularly updated and further developed. The range of available tests is constantly expanding. In addition to tests based on classical test theory, an increasing number of adaptive and multimedia tests are being developed using innovative technologies and modern test theory.

This technical documentation and help is designed to support users in making the most efficient use of the Vienna Test System (VTS).

For information on installing the system please see the section: Installation and configuration

Information on the use of the VTS can be found in the section: Usage

Technical specifications of our peripheral devices can be found in the section: Peripheral devices

Information about the changes in different VTS versions can be found in the section: Release Notes

If you require further assistance, our Support team will be happy to help.

This documentation is maintained and updated by SCHUHFRIED GmbH, please visit our website for the imprint & additional ressources.

We hope you enjoy working with the Vienna Test System!

2.1 Product description

2.1.1 Intended use

The Vienna Test System is SCHUHFRIED GmbH's software solution for computer-based psychological assessment. Its areas of application range from individual assessments and tests in personnel psychology to clinical neuropsychology, traffic psychology, and sports psychology.

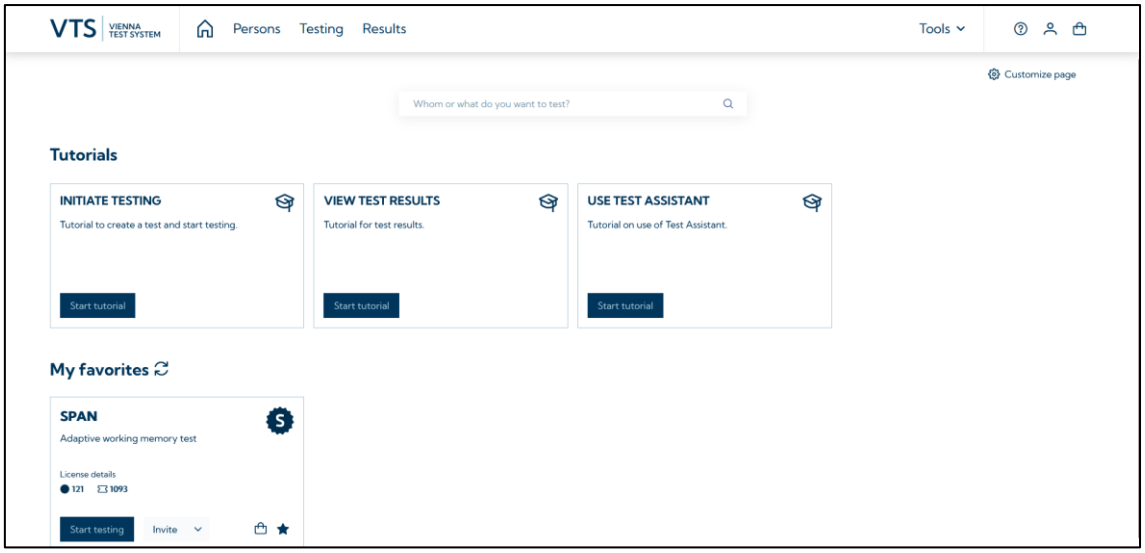
The Vienna Test System offers a wide portfolio of tests, including intelligence test batteries, special intelligence tests, ability tests, personality tests, and aptitude and interest tests. The tests are based on both classical and modern test theories and include adaptive and multimedia formats. They are designed to ensure the most comprehensive, fair, and valid psychological testing of a person.

The VTS consists of several components that can be used as needed, depending on the use case.

This page provides an overview of the functions and structure of the VTS, its different product variants, the required licenses and available purchasing options.

2.1.2 Structure and program components

The VTS consists of the VTS administration software, which is required for test presentation and the management of persons, test results, settings, and licenses. The administration software also manages VTS users (adding/removing users, managing rights). Provided that the appropriate licenses are available, testing can be started, and persons can be invited for testing directly from within the administration software.



The VTS administration software includes several components necessary for using the VTS:

- **Database**: SQL database for storing all relevant information and personal data or test results
- **Testplayer**: Application used to conduct tests. The Testplayer is available in a browser-based version (*Testplayer Web*) and a version that must be installed locally (*Testplayer Client*).

All functions of the VTS can be managed and used in the administration software. These include:

- **Managing test takers**: Creating new persons (either manually or via import), updating personal data, deleting persons → *Persons* page in the administration software. For more details see: Person management.
- **Presenting tests**: Selecting individual tests and configuring them (selecting test forms / subtests / scales), creating test batteries, assigning tests / test batteries to persons, initiating testing sessions or generating invitation links for testing in open mode or proctored mode → *Testing* page in the administration software- For more details see: Testing.
- **Viewing results**: Opening individual or multiple results, exporting results (PDF, .csv, VTS-format), creating reports → *Results* page in the administration software. For more information see: Results management.
- **VTS Tools**: Create your own tests using the Test Generator, maintain control over active testings using the Progress Monitor and perform further analyses of the test results in VTS Analytics.
- **SFS Tests Solutions:** Find easy-to-use, predefined test batteries for a variety of use cases and diagnostic question in the (8.30-en) SFS Test Solutions.
- **Managing settings**: Configuring test administration and scoring (e.g., generating and creating Word reports), as well as setting up email options for sending invitation links. For more information see: Settings.

You can get to know the VTS administration software with a free demo account in VTS online. Simply follow the registration process under *Register for demo account*.

2.1.3 Product variants

The VTS administration software is available in two variants: the **Vienna Test System online** and the **Vienna Test System offline**.

2.1.3.1 Vienna Test System online

The Vienna Test System online (VTS online) is SCHUHFRIED's cloud-based solution. All you need to use VTS online is internet access. There is no need to install the administration software locally on your device. You can manage all functions of the VTS administration software in your browser. You can access your data and results at any time and from anywhere. VTS online can also be used via the browser on devices that do not run on Windows operating systems.

Thanks to the cloud-based infrastructure, you benefit from regular automatic updates of VTS. Your tests are therefore always up to date and feature the latest norms and functions. Your data is automatically backed up and protected in the best possible way on European servers. The infrastructure required for the efficient use of the VTS is provided via the cloud. You don’t need to worry about whether your devices meet the system requirements for the VTS. A stable internet connection is required to use the VTS online.

The VTS online is the ideal solution for users who want to administer efficient digital psychological assessments without any installation or maintenance costs.

> A local software installation may also be necessary when using VTS online, for example, to administer tests that require additional input devices. In such cases, the Testplayer Client must be installed on the device used for testing. The Testplayer Client can only be installed on devices running the Windows operating system.

2.1.3.2 Vienna Test System offline

The VTS is also available as an on-premise solution (Vienna Test System offline). With this option, you receive an installation package that includes a specific VTS version. This allows you to install the VTS locally on your PC or server system. This means that the VTS is offline and linked to your local technical infrastructure and can only be run on the licensed devices. The VTS offline is only compatible with Windows operating systems.

Since all program components are installed on your devices, you always have full control over your data. However, depending on your specific use case, you must ensure that your devices' performance and configuration are suitable for the intended use. The VTS offline can also be used without an active internet connection.

WTS offline also has the ability to communicate with other software via interfaces. Provided that the external software supports the appropriate communication protocols, persons can be created in the VTS and test results can be retrieved via the external software, for example. More detailed information can be found on the page: Integration.

2.1.3.3 Comparison of product variants

If you would like to find out which of the two variants best suits your needs, please see comparison below:

Function	VTS online	VTS offline
Browser-based use of the VTS administration software (without local installation)	✓	✗
Cloud-based infrastructure (data backup, computing power)	✓	✗
Completely local data storage on your infrastructure (on-premise solution)	✗	✓
Automatic updates	✓	✗
Free updates	✓	✓
System requirements of the VTS must be met	✗	✓
Use of the VTS on operating systems other than Windows	✓	✗
Online testing via email invitation	✓	ℹ[1]
Internet connection required	✓	✗
Report generation	✓	✓
Test Generator	✓	✓
VTS Analytics	✓	✗
Interfaces for communication with other software (e.g., GDT, HL7, online a REST API is available)	✓	✓

[1] Online testing is only possible in VTS offline if the technical requirements are met (e.g., correct network configuration).

2.1.4 Update & Support

Our update & support policy can be found here.

2.1.5 How do I get started with VTS?

- You can try VTS free of charge. On the homepage of VTS online, you can register for a *demo account* and experience the VTS administration software with a selection of tests from the SCHUHFRIED Selection. When you take the tests, however, only the instructions are presented, not the test items.
- The VTS administration software, licenses for the tests and, if required, our hardware can be purchased via the Marketplace.

2.2 Available languages

This page provides an overview of the languages available for all tests and features in the VTS. Please note: The available languages may vary depending on the VTS version. The languages listed here refer to a specific VTS version, which is stated on the title page of this document.

The languages are identified by abbreviations. The abbreviations are assigned to languages as follows:

de-DE: German
en-US: English
arb: Arabic
bg-BG: Bulgarian
bs-BA: Bosnian (Latin)
cs-CZ: Czech
da-DK: Danish
el-GR: Greek
es-EE: Estonian
es-ES: Spanish
fi-FI: Finnish
fr-FR: French
hr-HR: Croatian
hu-HU: Hungarian
is-IS: Icelandic
it-IT: Italian
ja-JP: Japanese
lt-LT: Lithuanian
mr-IN: Marathi
nb-NO: Norwegian
nl-NL: Dutch
pl-PL: Polish
pt-PT: Portuguese
pt-BR: Portuguese (Brazil)
ro-RO: Romanian
ru-RU: Russian
sk-SK: Slovak
sl-SI: Slovenian
sr-RS: Serbian (Latin)
sv-SE: Swedish
tr-TR: Turkish
uk-UA: Ukrainian
urd: Urdu
vi-VN: Vietnamese
zh-CN: Chinese
zh-TW: Chinese (Taiwan)

2.2.1 Software & Features

Component	Available languages
VTS administration software	de-DE, en-US, cs-CZ, es-ES, fr-FR, hu-HU, it-IT, nl-NL, pl-PL, pt-PT, ro-RO, ru-RU, sk-SK, sl-SI, sv-SE, tr-TR, zh-CN
VTS Client Software	Language selection identical to the VTS administration software
VTS Testplayer Client	Language selection identical to the VTS administration software
VTS Analytics	de-DE, en-US
Test Generator	de-DE, en-US
Open Access tests	see: Open access tests

Please visit the online version of this documentation (https://help.schuhfried.com/) to view the tables listing the available languages per test.

2.3 System requirements

The Vienna Test System (VTS) is available as a cloud hosted solution (VTS online) and as an installable solution to be run on customer premises (VTS offline). If VTS offline is used, there is the option to set it up as a single workstation solution (installed only on one PC) or as a server/client solution in a network (see also: Product description). Depending on your selected solution & intended use-case different system requirements apply.

2.3.1 VTS online

As a cloud based solution based on web technologies, VTS online has no specific hardware or software requirements other than a modern web browser and a stable network connection (100 MBit/s or more are recommended for optimal functionality).

The following browser and operating system combinations are officially supported:

Browser / operating system	Windows	Mac OS X	Mobile
Microsoft Edge	✓	-	-
Firefox	✓	✓	-
Chrome	✓	✓	✓ (Android)
Safari	-	✓	✓ (iOS)

For tests requiring SCHUHFRIED hardware (see: Peripheral devices) as well as some older tests, an installation of the VTS Testplayer is necessary on the PC that is used for the testing (for details see: Additional requirements for specific tests). In such cases, the requirements stated for clients in a server/client solution apply. The VTS Testplayer for VTS online can be installed without administrator rights, except for the optional panel drivers. The drivers are however only needed when a panel is used.

2.3.2 VTS offline

All installable components of the VTS require a Windows based operating system running on a x86 based processor (Intel or AMD). The Windows user performing the installation needs to have administrator rights. Currently, the following versions of Windows are supported:

- Windows 11
- Windows Server 2016
- Windows Server 2019
- Windows Server 2022
- Windows Server 2025

VTS offline can also be installed and operated on Windows 10. However, since Microsoft ended mainstream support for Windows 10 in October 2025, VTS is only supported on Windows 10 systems that are enrolled in Microsoft's Extended Security Updates (ESU) program.

ARM based processors are not supported. It is not possible to install on Windows versions in S mode. The N and KN versions of Windows require the installation of the Media Feature Pack.

The required hardware specifications depend on the operation variant. The VTS can operate as single workstation solution with all system components installed on one

machine. For higher testing volume and many parallel test administrations, it can also be installed as a client/server solution with central data management.

2.3.2.1 Single workstation solution

Requirement	Minimum	Recommended
Processor (x86)	4 Core	≥ 8 Core
RAM	8 GB	≥ 16 GB
Disk space	10 GB	50 GB (SSD)
Graphics card memory	≥ 512 MB	

VTS can be operated with an integrated SQL Server Express server, which however imposes a 10 GB overall data limit. For higher data volumes, the use of a full Microsoft SQL Server is recommended, SQL Server 2016 until SQL Server 2022 are supported.

A USB port must be available for each peripheral device and the hardware license dongle, if one is used.

Additionally, the following software components may be required:

- Microsoft Word (version 2007) or compatible is required if *Word reports* (see: (8.30-en) Important terms and definitions) are to be viewed and edited.
- Microsoft XPS document needs to be be installed and activated for viewing or printing certain types of reports.

2.3.2.2 Server/client solution

2.3.2.2.1 Server

The required hardware specifications for the server depend on the planned number of parallel test administrations. In general, a client-server solution enables up to 200 parallel test administrations. The table below provides an approximate indication of the number of parallel test administrations possible with different hardware configurations. Please note that the actual capacity may vary depending on several factors, such as processor performance, installed software, and operating system configuration.

With appropriate infrastructure and system setup, the Vienna Test System also supports the parallel administration of more than 200 tests. We are available to provide guidance on the necessary requirements (for more information please contact us, see: Contact us).

Requirement	Minimum	Recommended	Requirement
Parallel tests	**≤ 50**	**≤ 100**	**≤ 200**
Processor (x86)	4 Core	≥ 8 Core	≥ 16 Core
RAM	8 GB	≥ 16 GB	≥ 32 Core
Disk space	10 GB	50 GB (SSD)	

For client/server installations the use of a full Microsoft SQL Server is recommended, SQL Server 2016 until SQL Server 2022 are supported.

A USB port must be available for each peripheral device and the hardware license dongle, if one is used.

Additionally, the following software components may be required:

- Microsoft Word (version 2007) or compatible is required if *Word reports* (see: (8.30-en) Important terms and definitions) are to be viewed and edited.
- Microsoft XPS document needs to be be installed and activated for viewing or printing certain types of reports.

2.3.2.2.2 Clients

Requirement	Minimum	Recommended
Processor (x86)	2 Core	≥ 4 Core
RAM	4 GB	≥ 8 GB
Disk space	1 GB	10 GB (SSD)
Graphics card memory		≥ 512 MB

2.3.2.2.3 Network requirements

A fast and stable connection between the clients and the server is required. A bandwidth of at least 100 Mb/s is recommended for the clients and 1000 Mb/s is recommended for the server. At lower bandwidths a sufficient performance of the VTS cannot be guaranteed. To minimize the effect of interference, a cable connection is recommended over a wireless connection. It is also important to ensure that the cabling of the network and other network components is sound.

The VTS uses HTTPS to connect between client and server. The system installs a self-signed SSL certificate by default. Those self-signed certificate are supporting typical DNS name ending .local, but should not be used with official domains. However, using a fully-fledged SSL certificate (RSA 2048 bit) is recommended when utilizing the system via the internet. For details see: Encrypted communication in VTS (https).

VTS uses multiple ports for communication that must be configured correspondingly/opened in the firewall. For details see: Server/client installation and Installation of the VTS clients.

2.3.3 General

- Some tests require specific hardware from SCHUHFRIED or other additional requirements, see Additional requirements for specific tests for details.
- We strongly recommend keeping the Vienna Test System up to date by always using the latest available version. This ensures access to the most recent features, performance improvements, and important bug fixes. For VTS Versions older than 36 months we do not offer technical support free of charge, for details see the section Update & support policy.
- We recommend monitors with a screen diagonal of 14“-27“ and a resolution of at least 1280 x 1024. The resolution should not exceed 1920 x 1200. For CRT monitors the refresh rate must be at least 75 Hz.
- Before you install the VTS please make sure to read through our guide: Installation and configuration

2.3.3.1 Safety features

If the Vienna Test System is used in healthcare services, the use of the following devices may be required:

- Medical grade isolation transformer in accordance with EN 60601

- Galvanic medical network insulation in accordance with EN 60601 (if the computer is connected to a data network)

Please consult your in-house health and safety officer.

The SCHUHFRIED input and output devices are developed and produced according to the technical safety requirements of EU Directive 93/42/EC, even though the Vienna Test System is not declared as a medical device. The CE mark confirms that our products comply with the technical safety regulations and the electro-magnetic compatibility norm (EN 60601 family of norms), bio-compatibility guidelines (EN 30993), product-specific requirements, and underlying quality management standards. For details visit the section: Peripheral devices.

Please consult us before purchasing new equipment. We will be happy to assist you in selecting the most suitable items for your needs.

2.3.4 Additional requirements for specific tests

For certain tests in the Vienna Test System, additional requirements must be met to ensure the test functions correctly. These additional requirements may include:

- The use of certain peripheral devices (hardware sold by SCHUHFRIED to administer the tests)
- Specific requirements for your PC (e. g. regarding screen size)
- Installation of the VTS Testplayer Client on the PC that is used for the testing

Please find below the tests and the additional requirements that must be met for each.

2.3.4.1 Use of peripheral devices

- The tests COG, DT, INHIB, PP-R, RT, SIGNAL, STROOP, SWITCH, VIGIL, WAF, WAFV, ZBA require any SCHUHFRIED panel.
- The test sets CFADHD, CFD, CFSD, COGBAT, DRIVE-FR, DRIVE-PL, DRIVEPLS, DRIVESC, DRIVESTA, FEV, SAAIR, SARAIL, SAROAD, SFTEAM, SLEEP, TATEENS2 require any SCHUHFRIED panel.
- The tests 2HAND and SMK require the SCHUHFRIED Universal panel.
- The test PP-R requires also the Peripheral Perception Unit 2 (PP-HW2) hardware.
- The test MLS requires the MLS Work Panel.

2.3.4.2 Specific requirements for your PC

- If you conduct tests in a browser it is required that the browser can run in full screen mode. Please make sure that your system allows this.
- WAF, WAFA and CFD can also be presented using a touchscreen. The use of a capacitive touchscreen is required.
- For the PP-R test the screen size should not be larger than 22".
- The WG test requires a screen size larger than 16".

2.3.4.3 Installation of the VTS Testplayer Client

Some tests require that the VTS Testplayer Client is installed on the PC that is used for the testing. Those tests can not be started without installation of the VTS Testplayer. **This also applies if you are using VTS online**.

For the VTS Testplayer Client the system requirements stated under *Clients* in the Server/Client section of the System requirements must be met.

The following tests require the installation of the VTS Testplayer Client:

- The tests: COG, DT, INHIB, PP-R, RT, SIGNAL, STROOP, SWITCH, VIGIL, WAF, WFV, ZBA, 2HAND, SMK, MLS, ATAVT, SMART (test form S1 only), 2D, 3D, COMPRO, BACO, GET, 5POINT, AWLT, LEVE, WIWO, WOBT, VISCO, GECO, WG, PAD, TOM, VIP, WRST/S1 & S2, LAMBDA-2
- The test-sets: CFADHD, CFD, CFSD, COGBAT, DRIVE-FR, DRIVE-PL, DRIVEPLS, DRIVESC, DRIVESTA, FEV, SAAIR, SARAIL, SAROAD, SFTEAM, SLEEP, TATEENS2

2.4 Licences

This section provides an overview of licensing in the Vienna Test System (VTS). In general, three different types of licenses have to be distinguished:

- **VTS Admin Client license** is a valid administration license required to access and operate the VTS environment / the VTS Administration Software
  - This license enables administrative and operational functionality such as:
    - user management
    - creation of test batteries
    - sending test invitations
    - executing tests
  - When the license expires, access to the VTS environment is limited to viewing and exporting existing test results
- **Execution test licenses**
  - Execution licenses enable the use of specific tests
  - These licenses do **not** work independently
  - A valid VTS Admin Client license must be present for the execution licenses to be usable
- **SFS Test Solutions**
  - SFS Test Solutions are available only with a valid SCHUHFRIED Selection (SFS) license

To obtain any of the licenses mentioned above, please visit the VTS Marketplace. Information on the installation of licenses can be found on the page: Install licenses.

For information on how to view available and used licenses, see License management.

3 INSTALLATION AND CONFIGURATION

Please follow the instructions carefully to ensure successful installation of the VTS.

3.1 VTS installation procedure

1. Make sure that you have the necessary licenses to install the VTS. There are three licensing options:
   - Product key
   - VTS dongle
   - manually created software dongle (if using a product key or a VTS dongle is not possible)
2. Make sure that your PC meets the system requirements.
3. If you want to install and use the VTS exclusively on one PC (= single workstation installation), please follow the instructions on the single workstation installation page to install the VTS administration software and the corresponding licenses.
4. If you want to set up the VTS as a server/client system, please follow the instructions on the server/client installation page to install the VTS administration software, the corresponding licenses, and the clients.
5. Do not connect the peripheral devices (e.g., the panel) until after installing the VTS. If you need to use a USB hub, one with a power supply is required.

If you encounter any problems during installation, our support team will be happy to assist you by email or phone.

3.1.1 Important information

- The VTS can **only be installed on Windows operating systems**. Apple-based hardware/operating systems are not supported for local VTS installations. However, the browser-based VTS online also allows to use VTS on Apple devices.
- Many PC manufacturers (e.g. Dell, HP, IBM, Lenovo) supply their own drivers for graphics cards. Please check that the latest drivers for your graphics card are installed on your computer.
- During the installation of the VTS, Microsoft® SQL Server Express (the exact version can be found in the system requirements) is installed by default. If necessary, the VTS can be installed on a different SQL server version. However, this must be installed manually and configured accordingly before installing the VTS. Detailed information can be found in the instructions for: Server/client installation
- All .exe files of the Vienna Test System are digitally signed. The validity of the certificate used for this is checked by the operating system by default.
- It **is not possible** to install the VTS via a remote connection with a VTS dongle (hardware dongle)! Example: You want to install VTS on PC 1, where the VTS dongle is also plugged in. You connect from PC 2 to PC 1 → In this case, installation on PC 1 is not possible because the VTS dongle is not recognized.

3.2 Licensing the VTS

There are three options available for licensing the VTS: licensing via a product key; licensing via a VTS dongle (hardware dongle); licensing via a software dongle - only for systems that are not connected to the Internet and where using a hardware dongle is not possible, e.g. server systems based on virtual hardware.

3.2.1 Licensing with product key

The product key is a code in the format (xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx) which you will receive by email after purchasing the VTS. This key must be entered during the installation process.

> To activate a product key, an internet connection is required during installation to verify its validity.

3.2.2 Licensing with VTS dongle

The VTS Dongle (hardware dongle) is a USB dongle that contains all your licenses. The dongle must be connected to the PC on which the VTS is being installed. It must also remain connected whenever the VTS is in use.

If you choose this licensing option, the VTS Dongle will be sent to you by SCHUHFRIED after purchase.

3.2.3 Licensing with software dongle

The software dongle is intended for scenarios where neither a product key nor a VTS Dongle can be used. This applies especially in cases where a server/client installation is to be carried out on servers without internet access.

If the VTS is licensed via a software dongle, a license that is linked to the physical hardware of your PC (= the software dongle) must be created and installed on your PC **before installation**. To do so, a *fingerprint* of the computer on which the VTS administration software will be installed must be generated **prior to the installation** of the VTS. Based on this fingerprint, SCHUHFRIED will generate all licenses required and requested for the VTS now and in the future. These newly created licenses will be sent to you separately by SCHUHFRIED. Please follow these steps:

1. Copy the *GetFingerprint* folder from the *Tools* directory in the VTS installation files or from the USB stick containing the installation files to a local directory on your computer. You need write access to this directory!
2. Start the program *GetFingerprint.exe.*
3. A file with the extension .c2v will be created in the same directory (e.g. *Fingerprint_COMPUTERNAME.c2v*).
4. Send this file to info@schuhfried.com.
5. After processing by SCHUHFRIED, you will receive an email with instructions on how to install the licenses.
6. Follow the instructions in the email to install the licenses or the instructions at: Install licenses

Please note that the fingerprint must be generated on the computer on which the VTS is installed.

The software dongle records hardware-dependent parameters of the computer on which it was created. This also applies to specific properties of a virtual system. If the virtual

system is “moved,” the software dongle becomes invalid and your Vienna Test System is blocked. For more details, please contact SCHUHFRIED support **before making any changes to the server**.

The following properties of the virtual system **must remain the same** for the software dongle to remain valid:

- Virtual MAC address
- CPU properties
- UUID (Universal Unique Identifier) of the virtual image; the UUID is generated by the virtualization software. When a clone is created, a new UUID is generated.

3.3 Single workstation installation

This page provides all the information you need to install the VTS for use on a PC. The installation and use of the VTS on a PC is referred to as a single workstation installation (local installation). During installation, the VTS administration software and all required program components are installed.

If you are updating the VTS to a newer version, please refer to the information prorvided on this page Updating a single workstation installation.

3.3.1 Prerequisites for installation

- The system requirements are met.
- You have all the necessary licenses.
- If necessary, you have USB ports for the VTS dongle and the peripheral devices.
- You have administrator rights.
- All Windows updates have been installed, and no updates are pending.

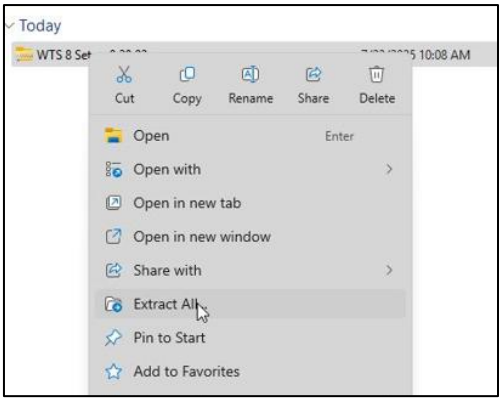
> Make sure your system meets the requirements and restart your system before starting the installation.

3.3.1.1 Licensing

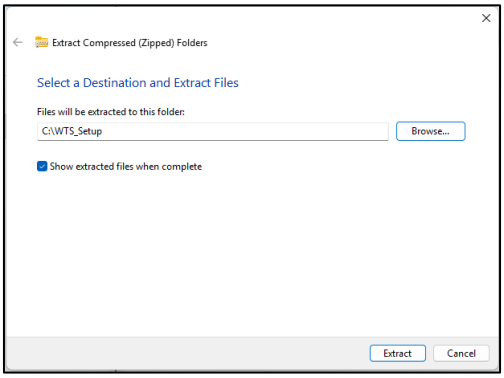
1. When using the product key: Have the product key ready and make sure you are connected to the internet. You will receive the product key in an email after purchase.
2. When using the VTS dongle (USB dongle): **Before installation, plug it into** the PC on which the installation is to be carried out and ensure it is recognized correctly (if necessary, unplug and reconnect it).

3.3.2 Installing the VTS

1. **Starting the setup**
    a. Download the setup (approx. 5 GB) using the link provided in the email from SCHUHFRIED after purchase. The setup is delivered as a .zip file. Unzip the file into a folder. The file path to the folder should not be too long (e.g., *C:\WTS_Setup*).
        i. To unzip, right-click on the folder containing the installation files and select *Extract All:*



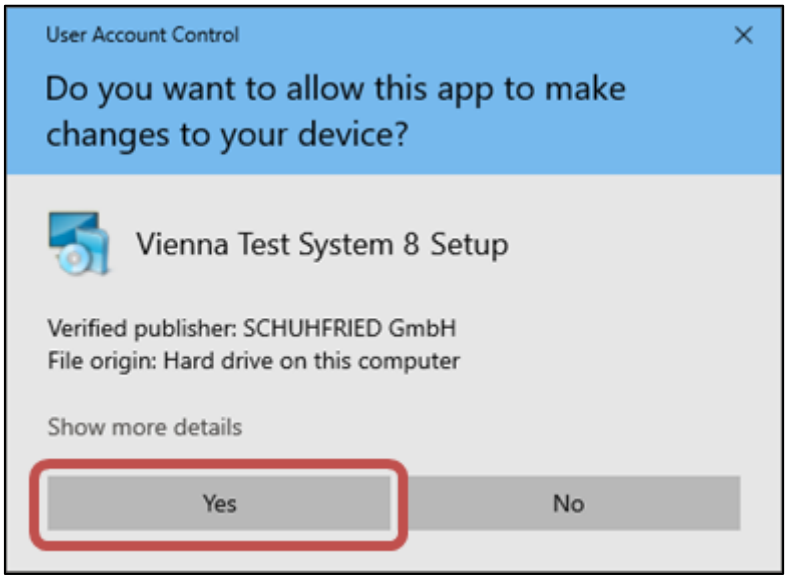
ii. Select a folder and confirm with *Extract*:



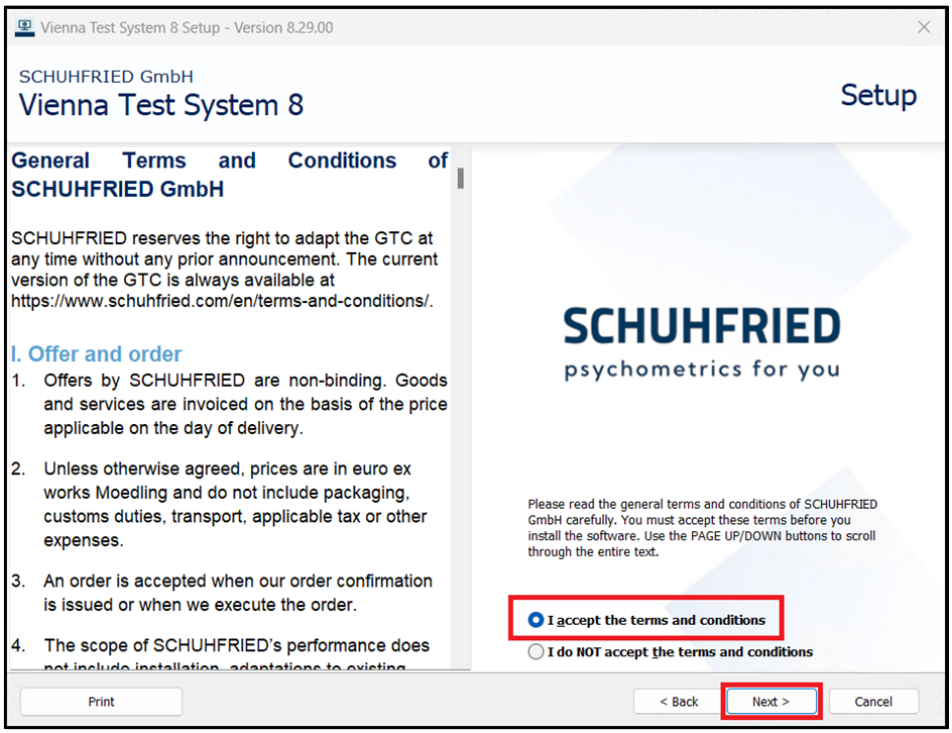
b. If the setup files are on a USB stick, plug in the USB stick and open the drive.

c. Start the installation by double-clicking on the file **Wts8Setup.exe**.

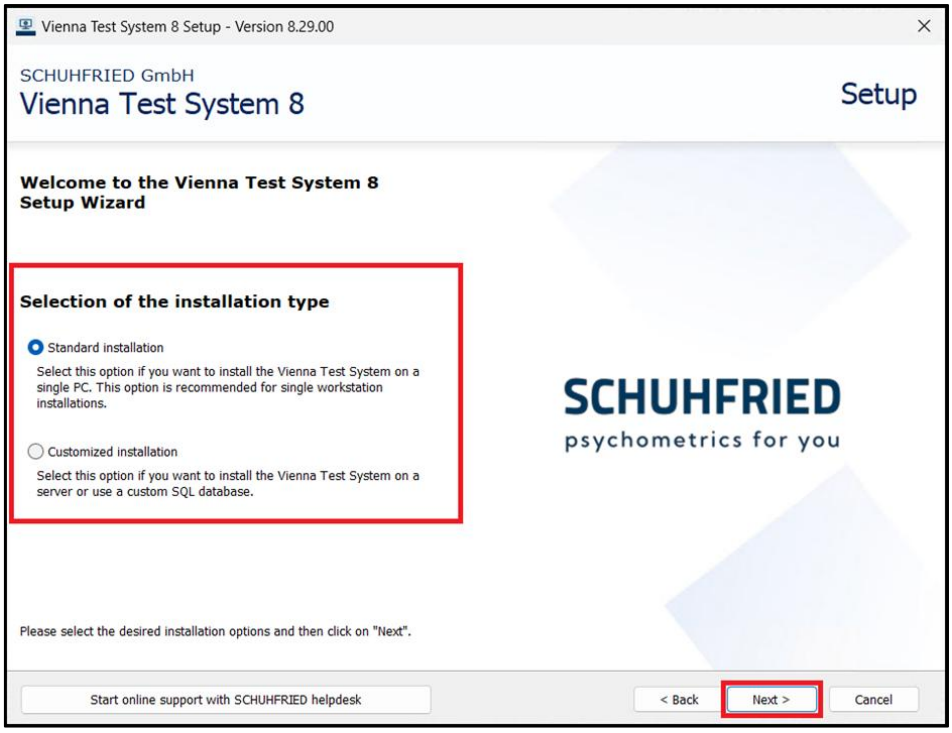
d. Confirm the Windows security prompt (*User Account Control*) by clicking *Yes*.



2. **Confirm the license agreement**
    a. Select *I accept the terms and conditions* and then click *Next.*



3. **Select the type of installation**
    a. For single workstation installations, we recommend selecting the *Standard installation* option.

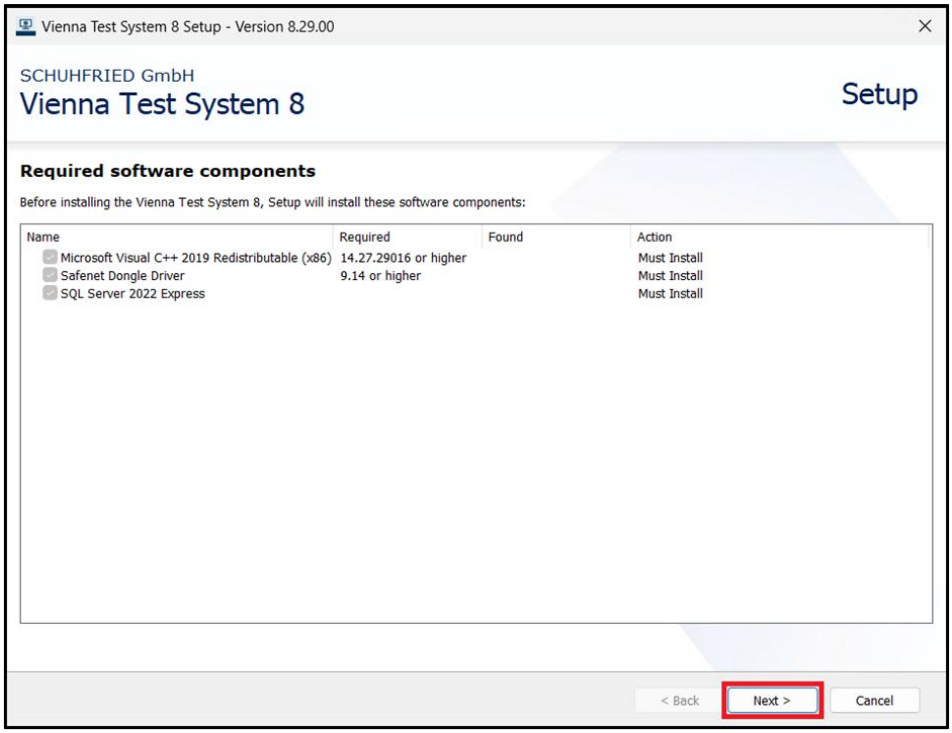


Note: The *Customized installation* option allows you to use your own SQL database for special use cases, which must be set up manually before installing VTS, and offers extended settings options for licensing (use of an external license server).

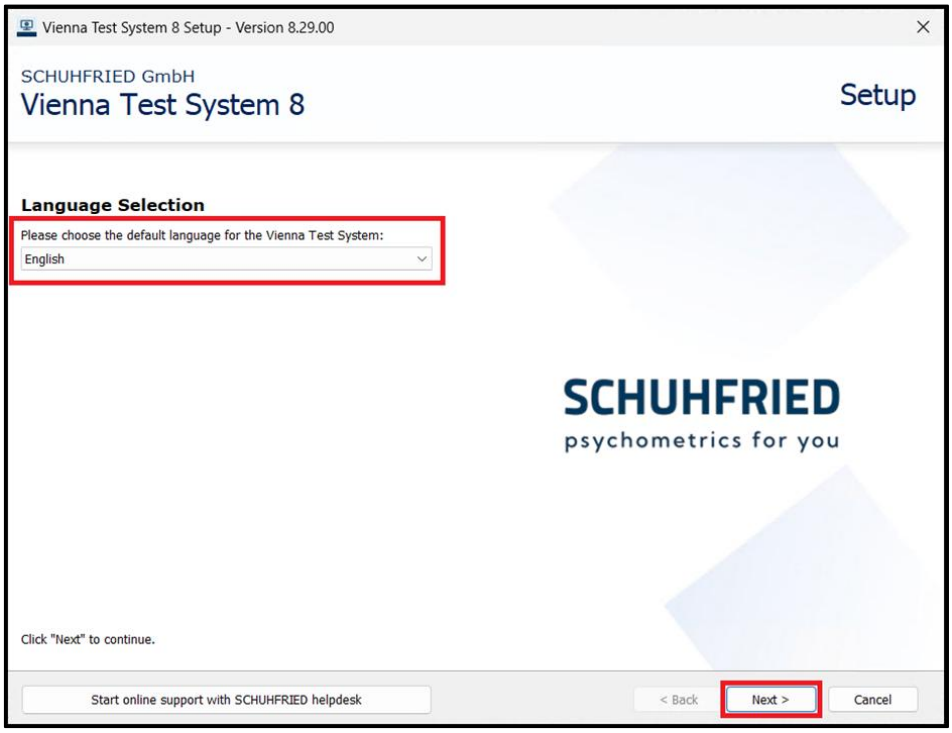
4. **Check required software components and install if necessary**

   a. The setup program will now check which software components need to be installed. Depending on your operating system and existing installations on your PC, different programs may be required. Once the system check is complete, a list of the programs to be installed will be displayed. Please do not make any changes.
   Note: If all required programs are already installed, this page will be skipped and the installation will continue with step 5 (*Select the language for the administration software*).

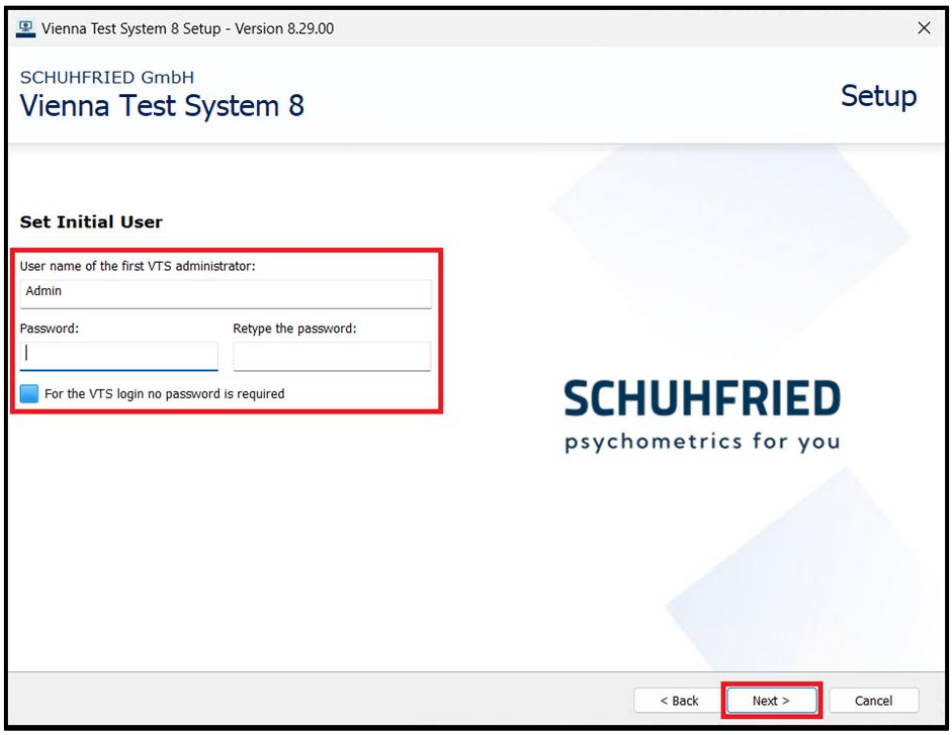
   b. Press *Next.*



5. **Select the language for the administration software**
   a. Select the desired language and press *Next.*
   b. The language of the administration software can be changed at any time after installation.



6. **Create first user (test system administrator)**
    - Define a user name (the VTS offers *Admin* as default) and a password for the test system administrator.
    - It is possible not to set a password (option: *For the VTS login no password is required*). Please note that in this case, other appropriate technical and organizational measures must be taken to ensure the security of personal data in accordance with the GDPR.

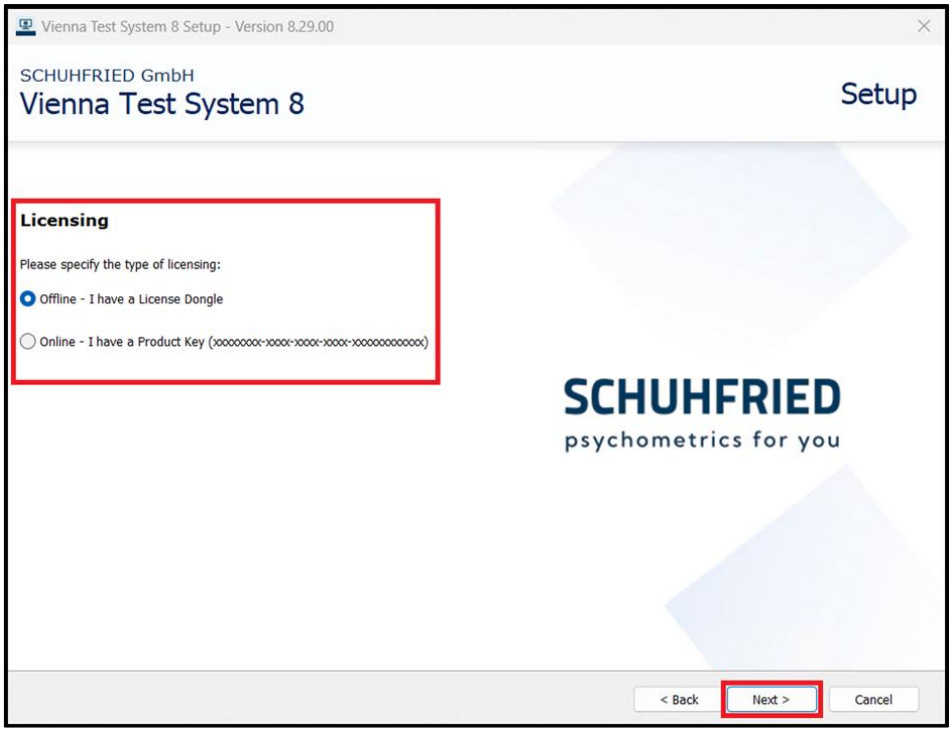


Guidelines for user names and passwords

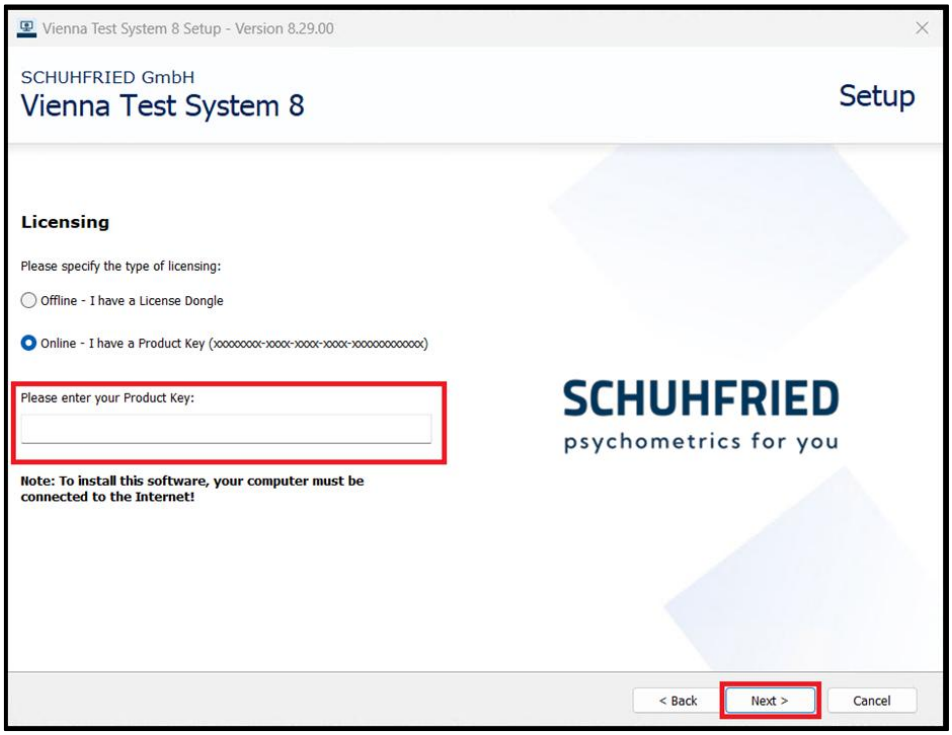
- The username must not start or end with a space.
- The username may only contain the following characters: A-Z, a-z, 0-9, and the special characters: !"#$%'*+-=?^_|~
- The password must be at least 8 characters long.
- The password may only contain the following characters: A-Z, a-z, 0-9, and the special characters: !"#$%'*+-=?^_|~
- **Be sure to note down the user name and password! The VTS cannot be started without these credentials.**

7. **Select licensing**

    a. Now select whether you want to use a VTS dongle (option: *Offline - I have a License Dongle*) or a product key (option: *Online - I have a Product Key*) for licensing.



b. If you select the option *Online - I have a Product Key*, you will now be prompted to enter the product key.



Please note that you will need an internet connection during installation if you are using a product key!

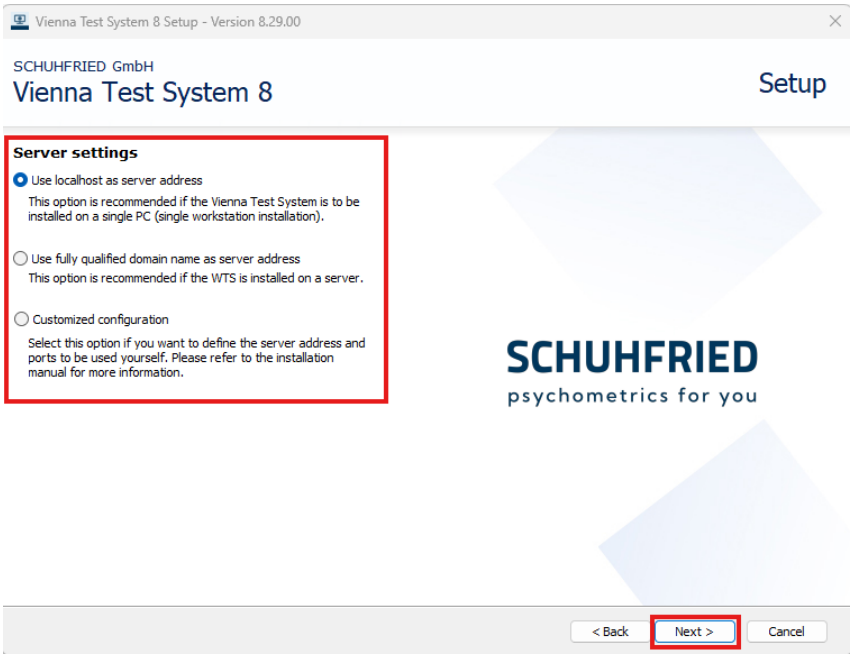
c. Confirm with *Next*.

8. Select the appropriate server settings

a. The VTS administration software can also be installed as a server/client system, where several PCs connected in a network with VTS Admin Clients access a central server. It is necessary to select the appropriate address for the server at this point.

b. For a **single workstation installation, we recommend using the option *'Use localhost as server address*.** This option is recommended if you want to install and use VTS exclusively on one PC.

   i. Select the option ***'Use localhost as server address*** and confirm with *Next.*



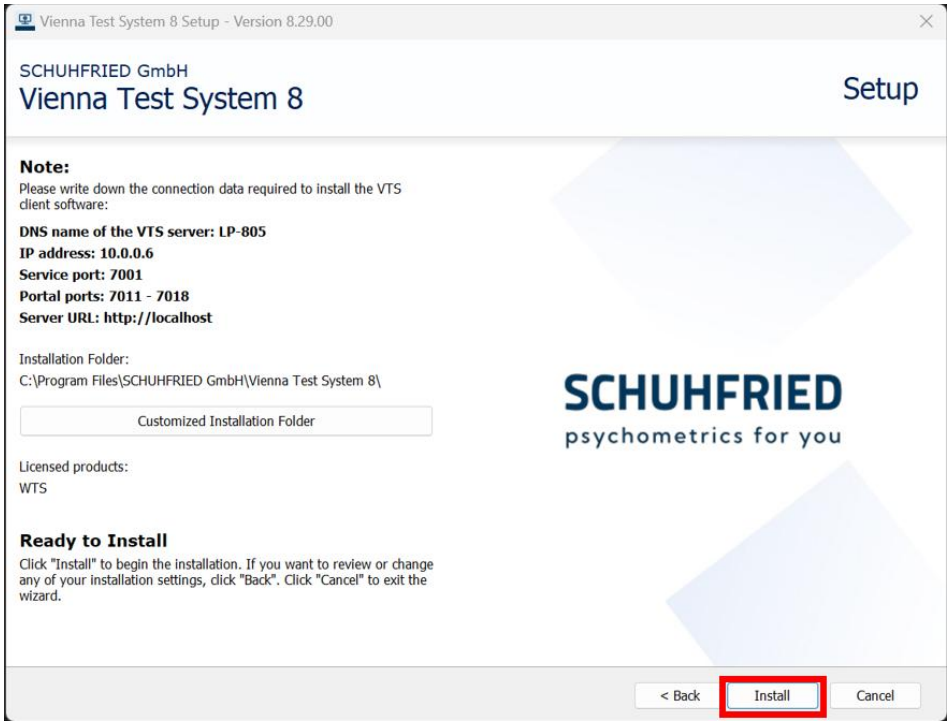
c. A detailed description of the other options can be found in the instructions for installing a VTS server system.

9. Start the installation

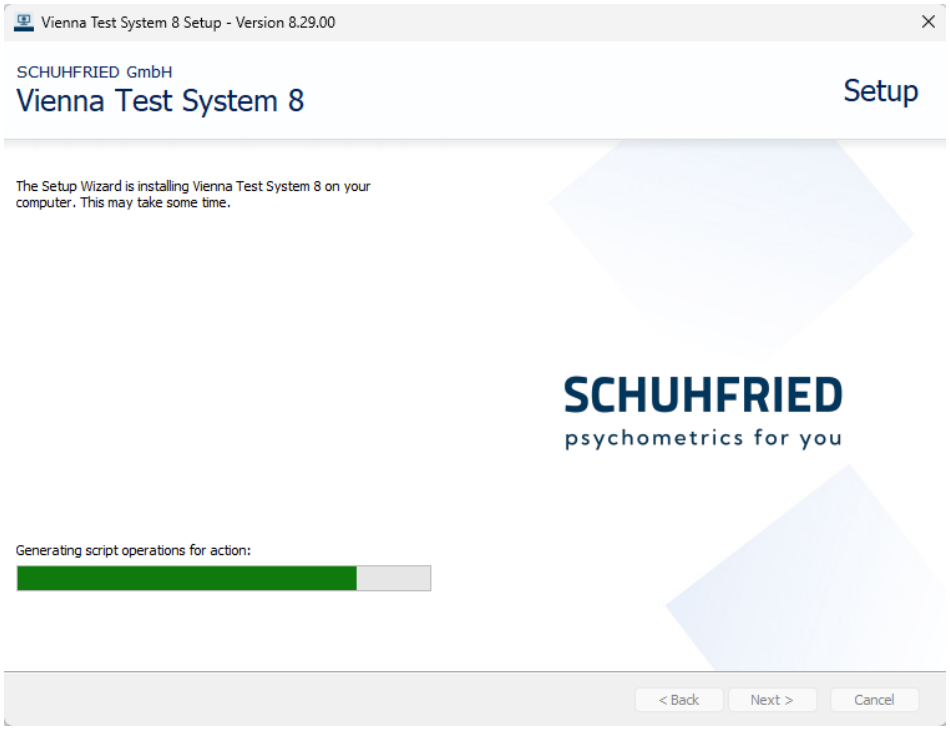
a. You will see a summary of the settings.

b. If necessary, change the installation folder using the *Customized Installation Folder* button.

c. Start the installation by clicking the *Install* button.



d. The installation is in progress. This may take several minutes.

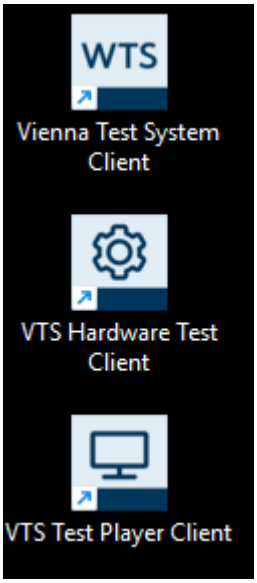


e. If the installation was successful, you will see a note that you must confirm with *OK*.

3.3.3 Checking the installation

- If you want to make sure that the installation was successful, you can check whether the *WTS Service* has been started.

- To do so, start the VTS Admin Client or the Testplayer using the shortcuts on the desktop.



- If you have purchased peripheral devices, please perform the **hardware test** to ensure that all devices have been installed successfully.

3.3.3.1 Notes

- The VTS administration software can also be installed via command line. Details can be found on the page: Silent installation via command line
- Please consider setting up a data backup: Backup & recovery of the VTS

3.3.4 After successful installation

System performance can be affected by specific hardware specifications, local configurations, and environmental factors. To ensure optimal VTS operation, we recommend proactive system checks to identify potential bottlenecks. A common cause of interference is real-time antivirus scanning. Therefore, we strongly suggest adding VTS-related processes and folders to your antivirus exclusion list. For a detailed guide on mitigating these issues, please refer to our related troubleshooting guide: Degraded Performance.

3.3.5 Updating a single workstation installation

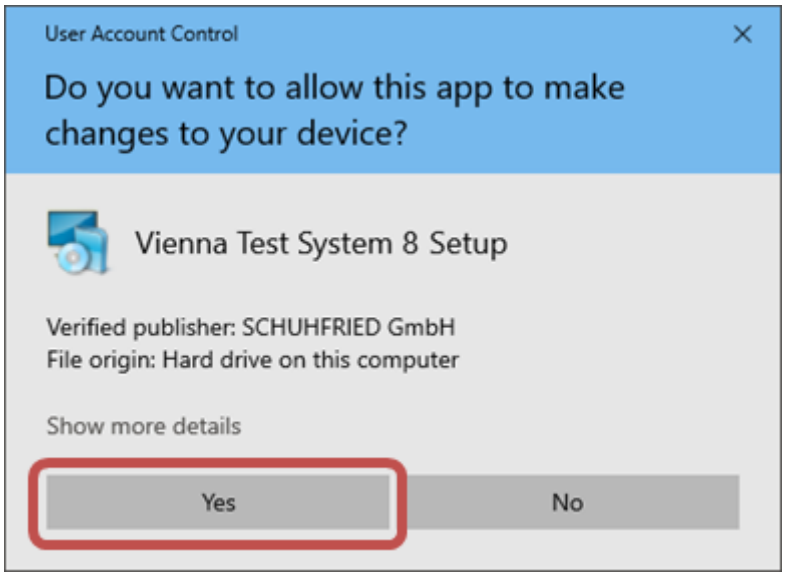
These instructions describe how to update your single workstation installation to a newer VTS version.

3.3.5.1 Update requirements

- You have the installation files for the new VTS version (you can download these or obtain them from SCHUHFRIED).
- You have the necessary licenses.
- You have administrator rights on the PC where the VTS is installed.
- Sufficient free memory is available.
- Perform a manual update of the SQL database if you did use a custom SQL database (i.e. the VTS was not installed with the default SQL Server Express database): Manual update of the VTS SQL database.

3.3.5.2 Performing the update

1. Perform a **backup**: Backup & recovery of the VTS
2. **Start the update**
   a. Start the PC and log in with a user **who has local administrator rights**.
   b. Download the setup for the new VTS version (approx. 5 GB) using the link provided in the email you received from SCHUHFRIED after your purchase. The setup is delivered as a .zip file. Unzip the file into a folder. The file path to the folder should not be too long (e.g., *C:\VTS_Setup*).
   c. If the setup is on a USB stick, insert the USB stick and open the drive.
   d. Start the installation by double-clicking on the file **Wts8Setup.exe**.
   e. Confirm the Windows security prompt (*User Account Control*) by clicking *Yes*.



3. **Follow the installation program**
   a. When updating, the installation program must be run as described on the page Single workstation installation.

3.3.5.3 Troubleshooting

- If you try to update an older version of VTS, it can happen that the SQL Server version is no longer supported by the new setup. In that case manual adaptations are necessary. See the description on the page: Update from older SQL Server versions.

3.4 Server/client installation

On this page you will find all the information you need to install the VTS for use as a server/client system. A server/client system consists of one (or more) PCs that serve as servers where the VTS database and the VTS administration software are installed. On other PCs connected to the server via a network (local or internet), the VTS client applications can be installed. These allow testing (using the Testplayer Client) or managing the VTS (using VTS Admin Client).

> More detailed information on installing the clients can be found on the page Installation of the VTS clients.

If you are updating the VTS to a newer version, please note the information on the page Updating a server/client installation.

The VTS administration software can also be installed via command line. Details can be found on the page Silent installation via command line.

3.4.1 Requirements for installation

- The system requirements are met.
- You have all the necessary licenses.
- You have administrator rights on the server where VTS is to be installed.
- All required ports are enabled and not blocked:
  - This is in any case the port: 1947
  - When using the default settings, the ports are: 7001, 7011, 7012, 7013, 7014, 7015, 7016, 7017, 7018
  - If using custom ports: all custom ports
  - Note: The check can be performed using a PowerShell command (e.g. `Test-NetConnection -ComputerName 127.0.0.1 -Port 1947`).
- All Windows updates have been installed, no updates are pending.

> Make sure your system meets the requirements and restart your system before starting the installation.

3.4.2 Using your own SQL database

In the *standard installation*, the VTS installs the supplied Microsoft® SQL Server Express version (the exact version can be found in the system requirements).

For certain applications and high data volumes, it may be necessary to use a different Microsoft® SQL Server version. This option is available via the *customized installation* of the VTS.

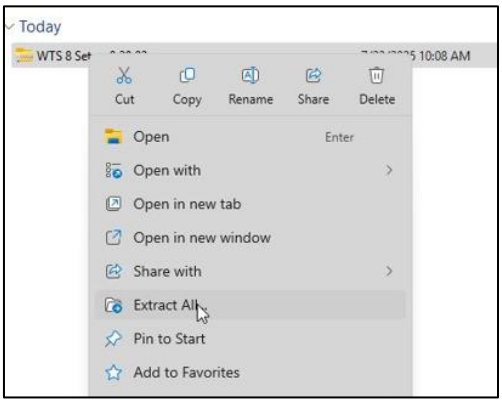
> If you are performing an **initial installation** of a VTS server/client system and are not using the supplied Microsoft® SQL Server Express version, **the appropriate Microsoft® SQL Server and the VTS database must be installed manually using the corresponding scripts before starting the VTS installation**. The instructions can be found on the page Manual installation of the VTS SQL database.

3.4.3 Licensing

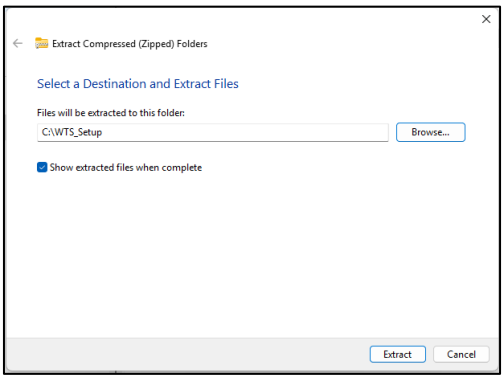
1. When using the product key: Have the product key ready and ensure that you have an internet connection on the server. You will receive the product key via email after purchase.
2. When using the VTS dongle (USB dongle): **Before installation, connect it to the server on which** the installation is to be carried out and ensure that the dongle is recognized correctly (if necessary, unplug and reconnect it).
3. If you are using the software dongle, install the corresponding license files on the server on which the VTS is to be installed **before you** start the installation. You will find the corresponding instructions in the email you received from SCHUHFRIED together with the license files.

3.4.4 Installing the VTS

1. **Starting the setup**
   a. Start the server and log in with a user who **has local administrator rights**.
   b. Download the setup (approx. 5 GB) using the link provided in the email you received from SCHUHFRIED after purchase. The setup is delivered as a .zip file. Unzip the file into a folder. The file path to the folder should not be too long (e.g., *C:\WTS_Setup*).
      i. To unzip, right-click on the folder containing the installation files and select *Extract All:*



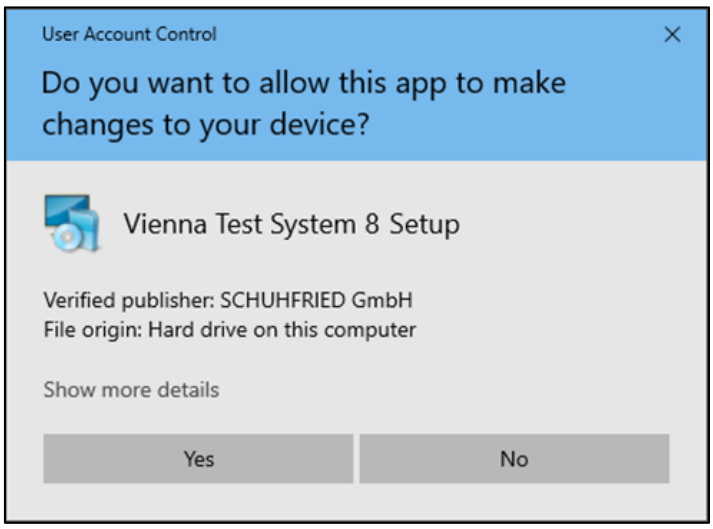
      ii. Select a folder and confirm with *Extract*:



c. If the setup is on a USB stick, connect the USB stick and open the drive.

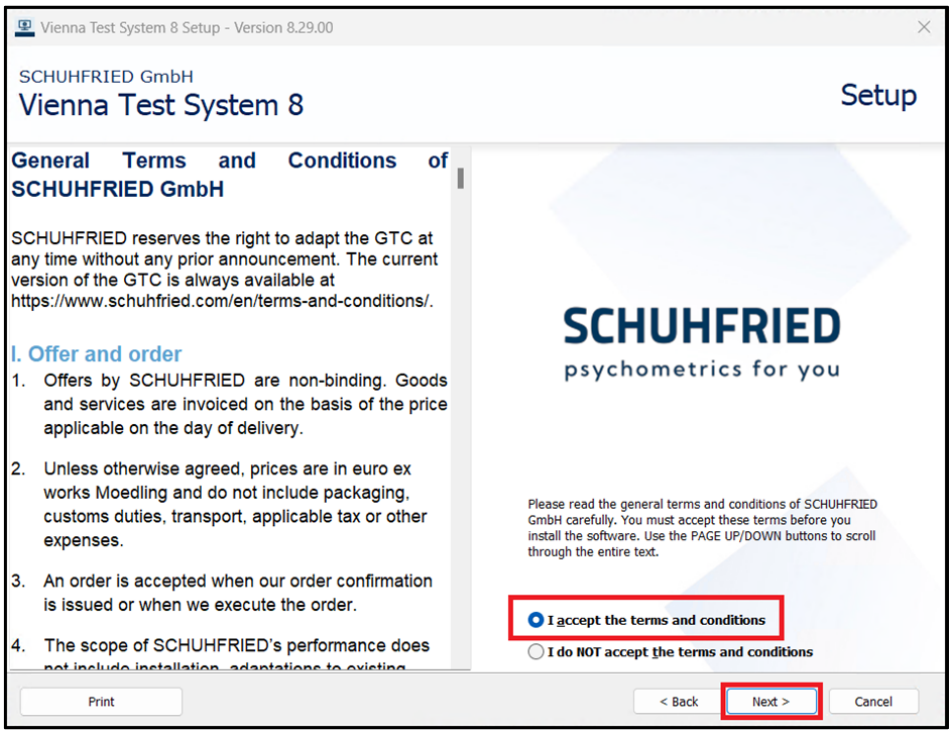
d. Start the installation by double-clicking on the file **Wts8Setup.exe**.

Confirm the Windows security prompt (*User Account Control*) by clicking *Yes*.



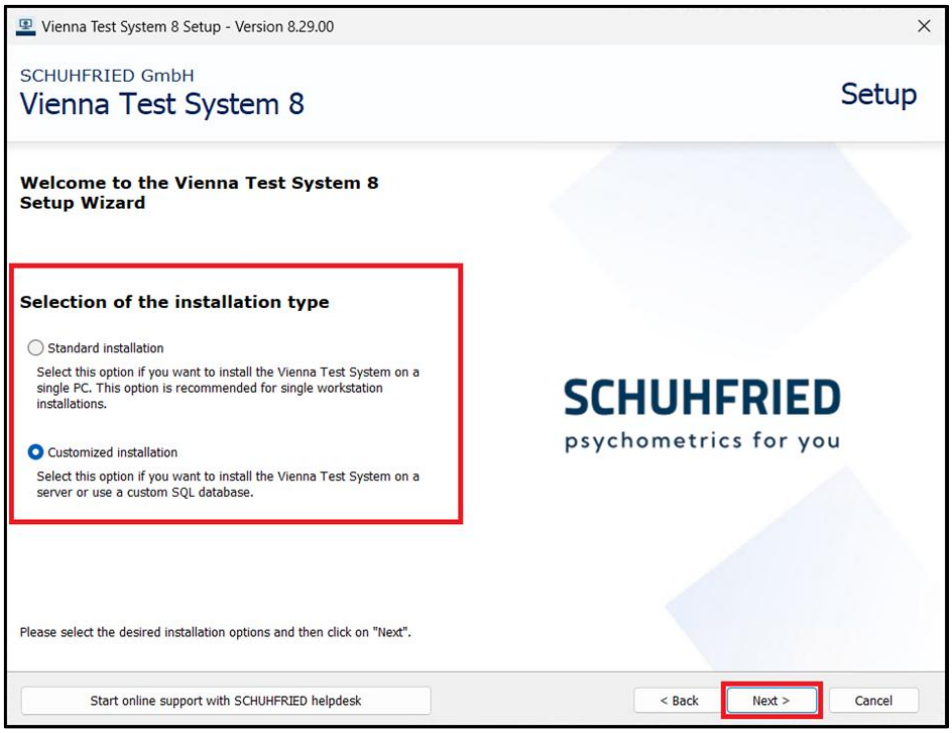
2. Now confirm the license agreement

a. Select *I accept the terms and conditions* and then click *Next.*



3. Select the type of installation

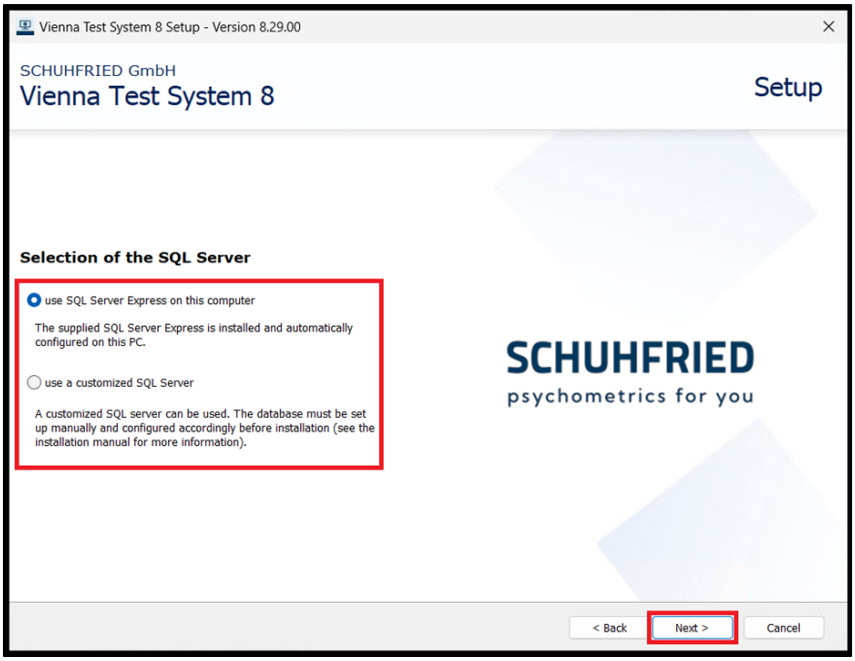
a. When installing a server/client system, we recommend the *Customized installation* option. Select this option and press *Next.*



b. On the next page, select:

   i. whether you want to use the **supplied Microsoft® SQL Server Express version** (option *use SQL Server Express on this computer*)

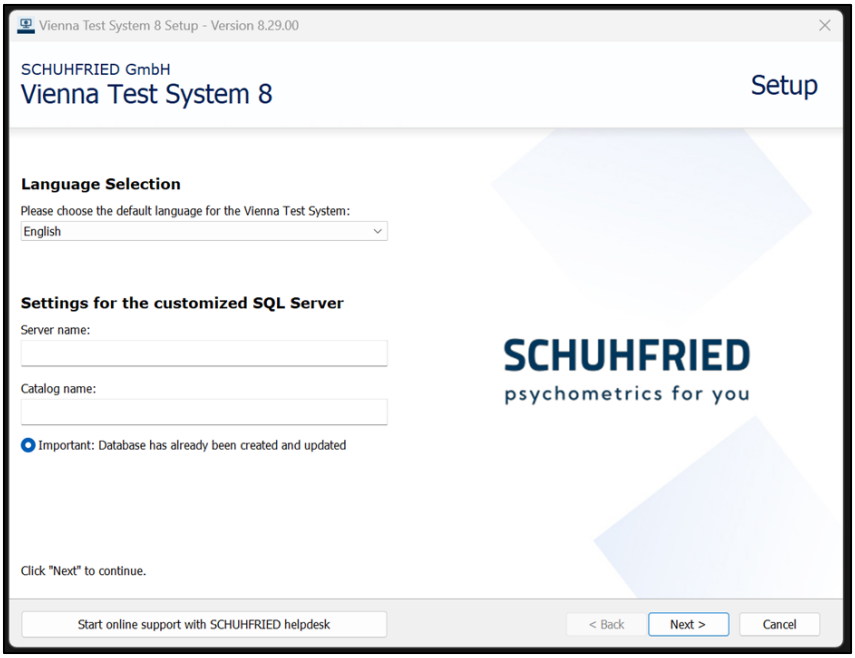
   ii. or whether you want to **use a custom Microsoft® SQL Server** and press *Next.*
   ATTENTION: To use a custom Microsoft® SQL Server Express during installation, it must already be installed manually and the VTS database must be prepared. See: Manual installation of the VTS SQL database.



c. If you selected the option *use a customized SQL Server*, you must do the following on the next page:

   i. Select the desired **language for the administration software** (this can be changed at any time after installation).

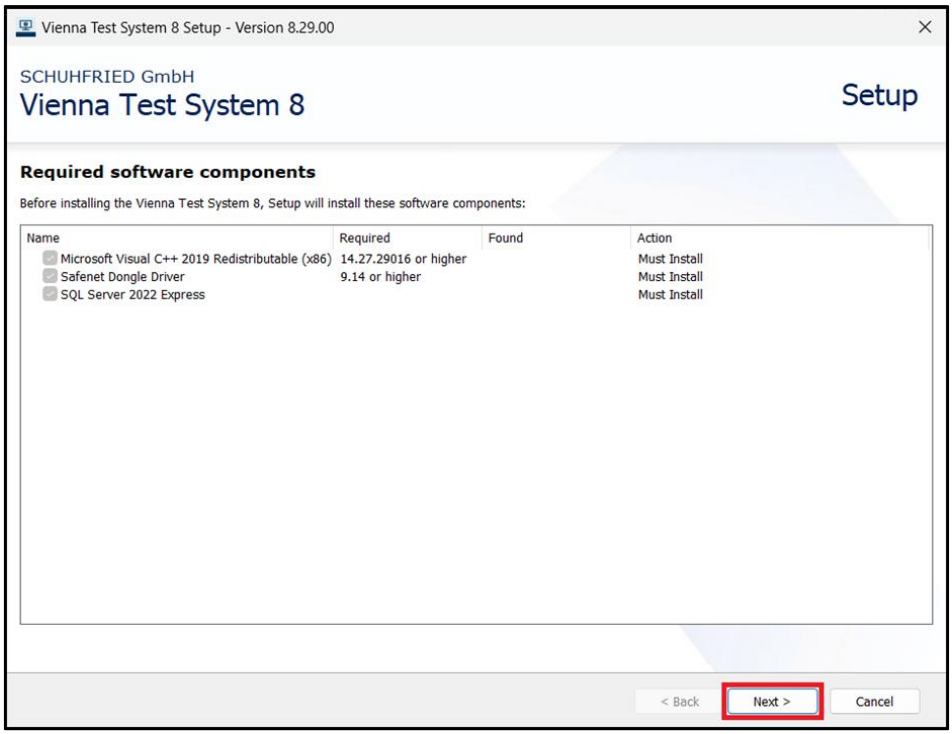
   ii. Enter the **server name and catalog name of the customized (and already set up) SQL server**.



4. Install required programs

a. The setup will now check which required programs need to be installed. Depending on your operating system and existing installations on your PC, different programs may be required. Once the system check is complete, a list of the programs to be installed will be displayed. Please do not make any changes.

Note: If all required programs are already installed, this page will be skipped and the installation will continue with step 5 (*Select the language of the administration software*).

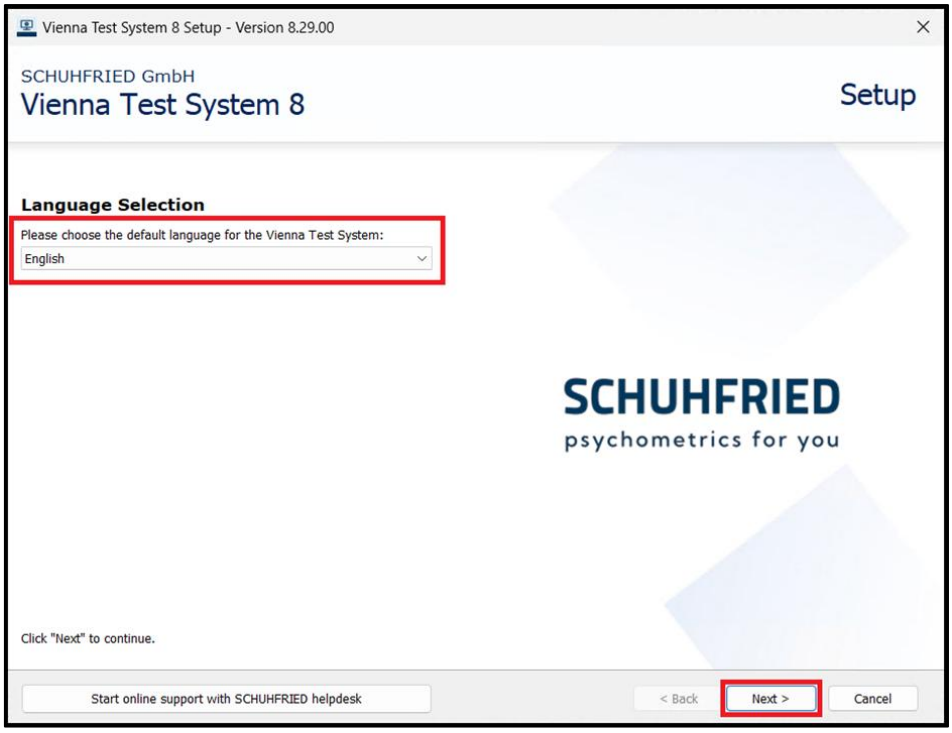


b. Press *Next*

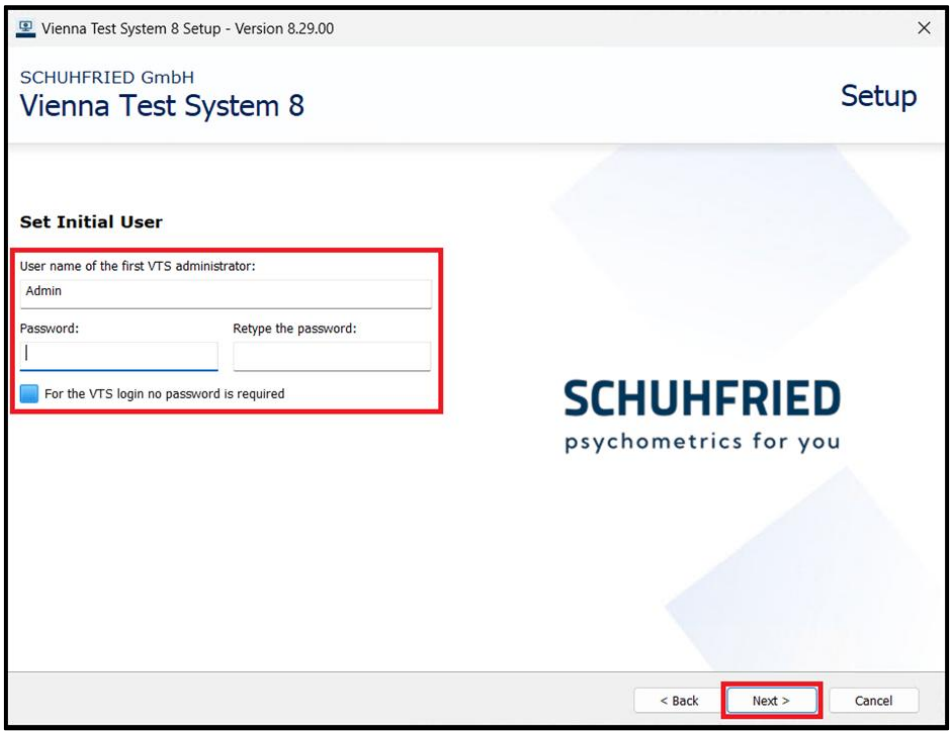
5. Select the language for the administration software (optional)

a. If you did not select the option *use a customized SQL server* in step 3 (*Select the type of installation*), you must now select the desired language for the administration software and press *Next.*

b. The language of the administration software can be changed at any time after installation.



6. **Create first user (test system administrator)**
   - Define a user name (the VTS offers *Admin* as the default) and a password for the test system administrator.
   - It is possible not to set a password (option: *For the VTS login no password is required*). Please note that in this case, other appropriate technical and organizational measures must be taken to ensure the security of personal data in accordance with the GDPR.

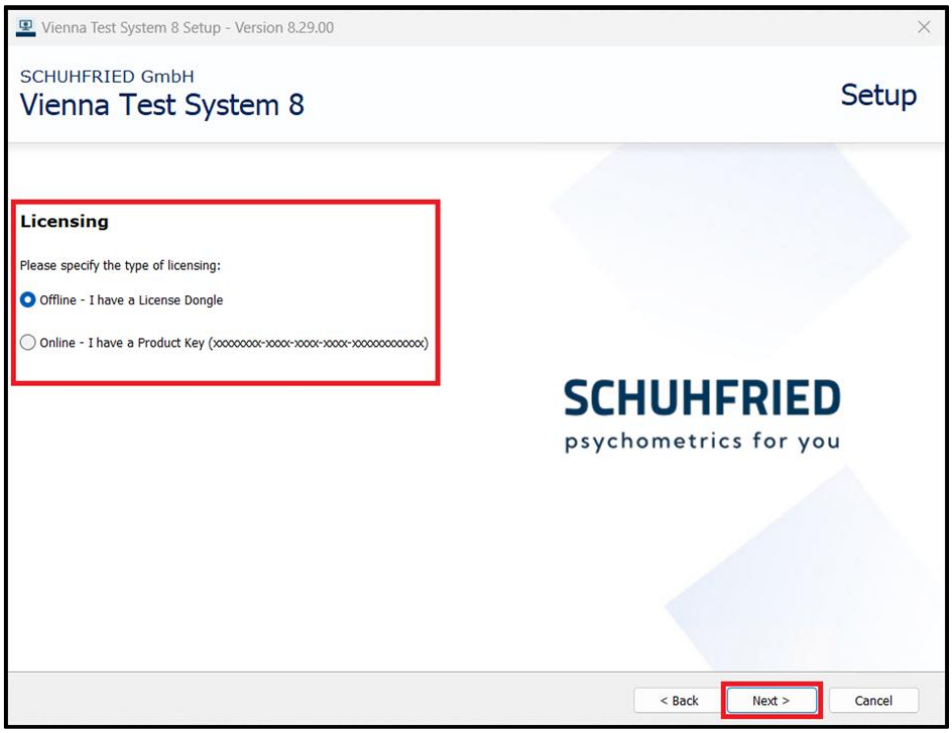


Guidelines for the user name and password

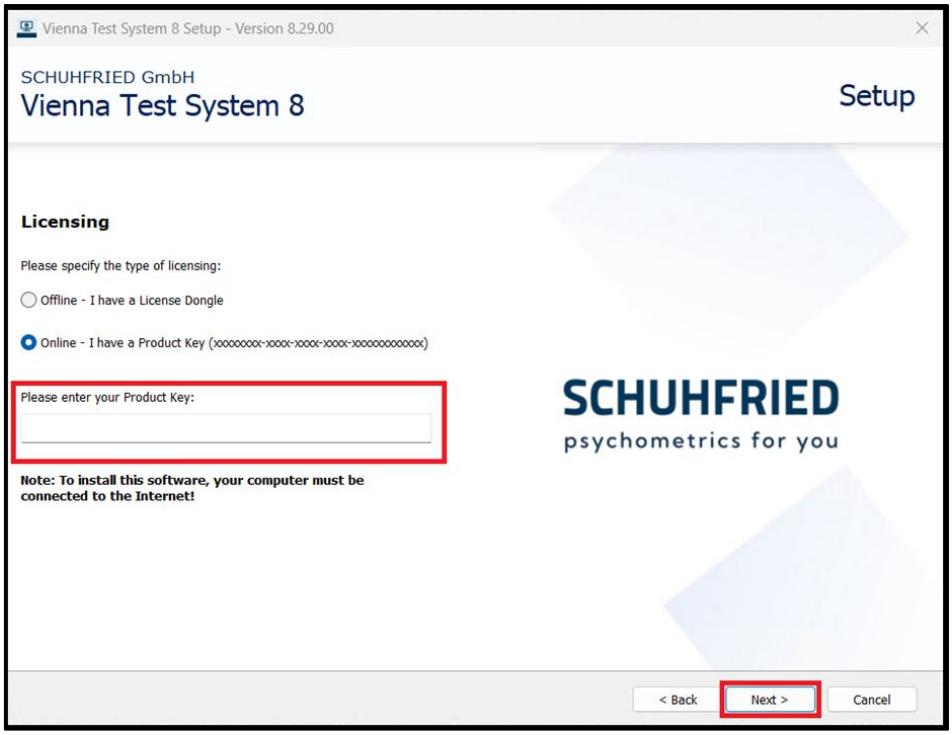
- The user name must not start or end with a space.
- The user name may only contain the following characters: A-Z, a-z, 0-9, and the special characters: !"#$%‘*+-=?^_|~
- The password must be at least 8 characters long.
- The password may only contain the following characters: A-Z, a-z, 0-9, and the special characters: !"#$%’*+-=?^_|~
- **Be sure to note down the user name and password! The VTS cannot be started without these credentials.**

7. **Select licensing**

   a. If you are not using a software dongle, you must now select whether you want to use a VTS dongle (option: *Offline - I have a License Dongle*) or a product key (option: *Online - I have a Product Key*) for licensing.

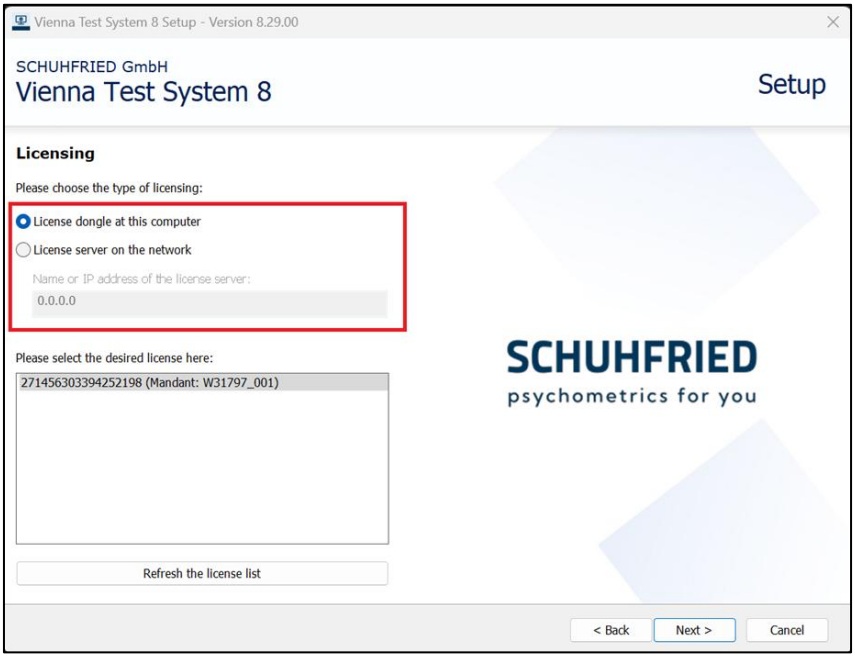


   b. If you select the option *Online - I have a Product Key*, you will now be prompted to enter the product key.



Please note that if you are using a product key, you will need an internet connection during installation!

8. **Select where your license dongle is located**
    a. Now select where the license dongle to be used is located:
        i. Select the option *License dongle on this computer* if the license dongle is located on the server on which VTS is being installed. This applies both when using a software dongle and when using the VTS dongle.
        ii. If the license dongle is located on another PC in the network, the option *License server on the network* can be selected.



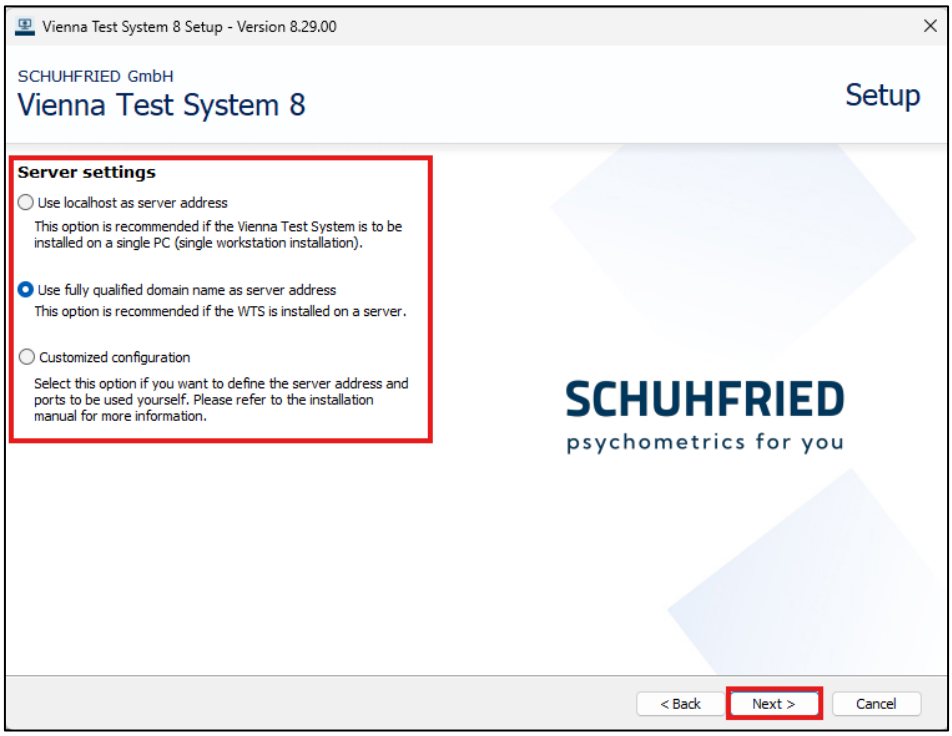
b. If you have selected the option *License server on the network*, you must enter **the name of the license server or the IP address** in the field below the option.

c. If several multi-client systems are available, select the multi-client system that is to be used for the installation (field *Please select the desired license here*).

9. Select the appropriate server settings

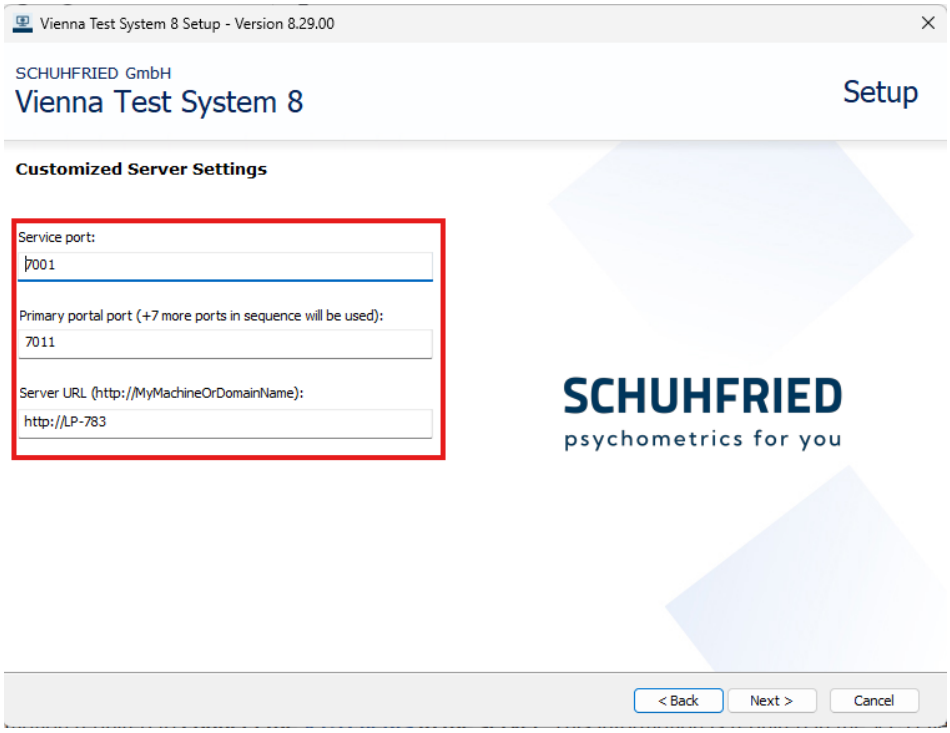
a. For a server/client installation, we recommend using the option *Use fully qualified domain name as server address.*

b. If you want to specify the server address and the ports to be used yourself, select the option *Customized configuration.*



c. If you have selected the *Customized configuration* option, you must now **specify the address of the server** on which the Vienna Test System will be installed. You can also **select the ports** to be used for communication between the server and clients (or accept the default values).

ATTENTION: The ports specified here must be open for access by the VTS clients!

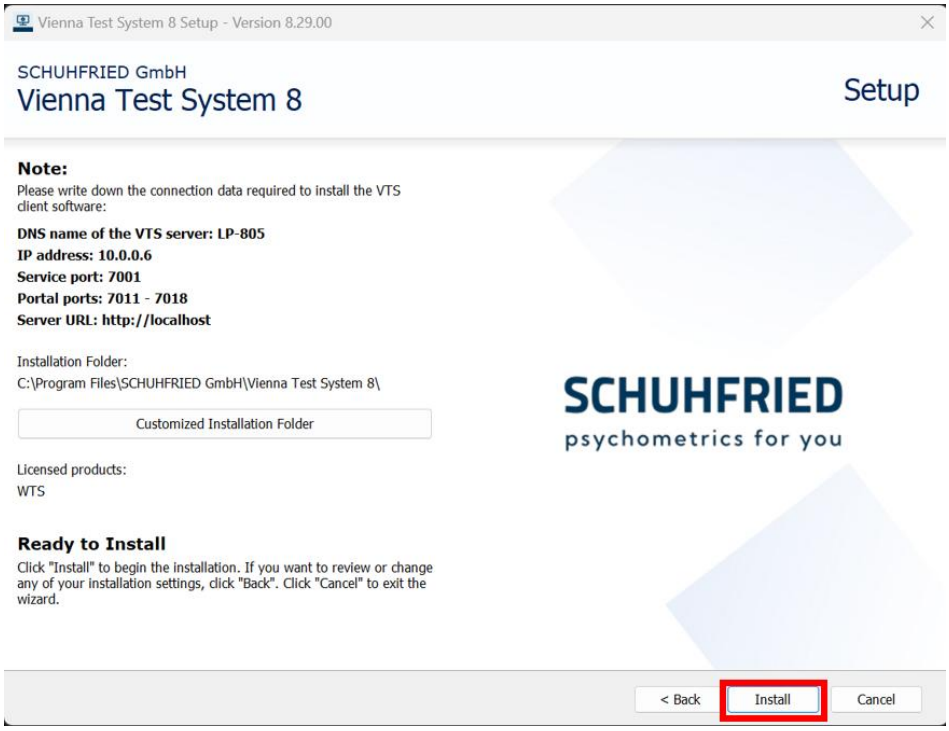


10. Start the installation

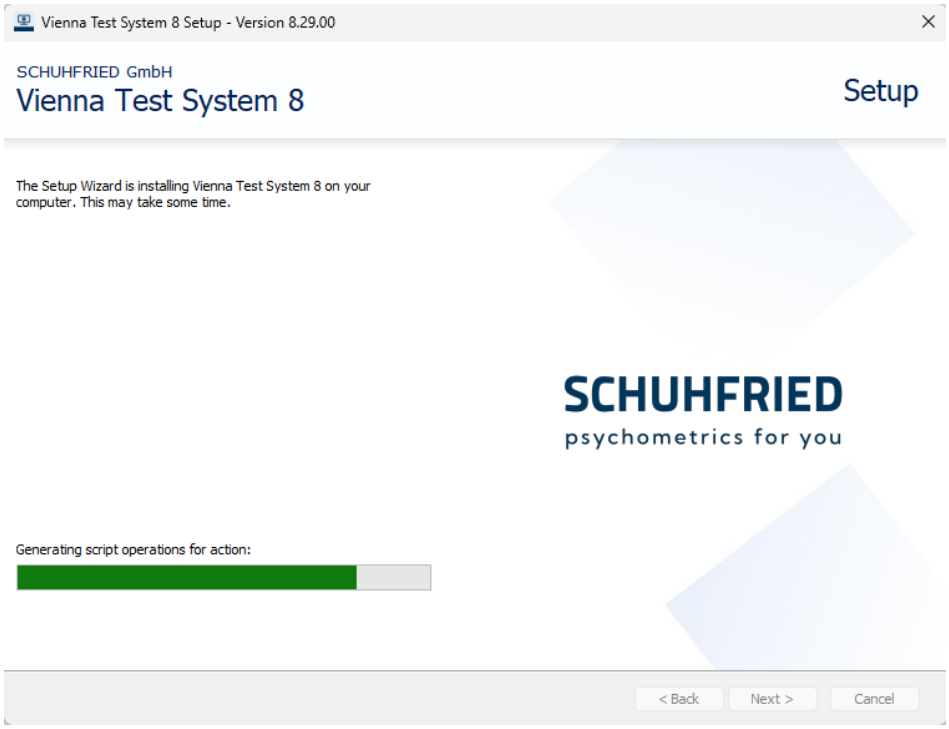
a. You will see a **summary of** the settings and all the information required to **connect the VTS clients to the server**. This information is required in the VTS client setup.
Make a note of this data and keep it in a safe place. You will need this information to install all VTS clients!

b. If necessary, change the **installation folder** using the *Customized Installation Folder* button.

c. Start the installation by clicking the *Install* button.



d. The installation will be carried out. This may take several minutes.

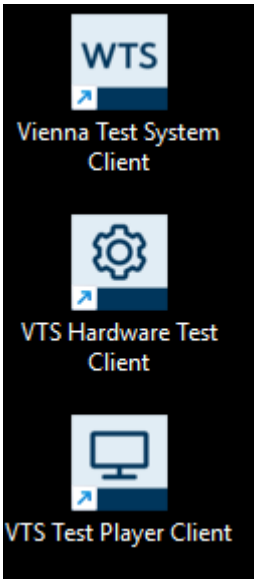


e. If the installation was successful, you will see a note that you must confirm with *OK*.

3.4.5 Checking the installation

- If you want to make sure that the installation was successful, you can check whether the *WTS Service* has been started.

- To do this, start the VTS Admin Client or the Testplayer Client using the shortcuts on the desktop.



- If you have purchased peripheral devices, please now perform the **hardware test** to ensure that all devices have been installed successfully.

3.4.5.1 Notes

- The VTS can also be installed using a command line (silent installation): Silent installation via command line
- Please consider setting up a data backup: Backup & recovery of the VTS

3.4.6 After successful installation

System performance can be affected by specific hardware specifications, local configurations, and environmental factors. To ensure optimal VTS operation, we recommend proactive system checks to identify potential bottlenecks. A common cause of interference is real-time antivirus scanning. Therefore, we strongly suggest adding VTS-related processes and folders to your antivirus exclusion list. For a detailed guide on mitigating these issues, please refer to our related troubleshooting guide: Degraded Performance.

3.4.7 Installation of the VTS clients

These instructions describe how to install the **VTS client software**. The VTS client software is used to install the VTS administration software and the Testplayer on additional PCs in the network in server/client systems, enabling access to the central VTS server and its stored data.

The VTS client software enables the setup of distributed systems across multiple locations in a server/client system. A practical example is a system for group testing: several test rooms, where the VTS Admin Client is installed on the test supervisor's PC and the VTS Testplayer Client is installed on the test stations. The central VTS server manages the persons, test data, settings, and licenses.

The VTS client software must be installed on the corresponding PCs in the network. An **additional installation package** (e.g. *WTS 8 Client Setup 8.28.01.zip*) is available for this purpose. The installation package contains two client programs:

- **VTS Testplayer Client**: used to start the tests.
- **VTS Admin Client**: the administration software for the VTS. Depending on the rights of the user, the VTS can be managed, persons can be created and test results can be viewed here.

An **alternative** to using the VTS client software **is to use the browser-based VTS user interface**. In a server/client system, the administration interface of the VTS (as well as the Testplayer Web) can be accessed directly in the browser via the corresponding URLs. A local installation is not necessary for this. Depending on the application, it may still be necessary to install the VTS Testplayer Client on the devices on which testing is to be carried out (especially if certain tests that require input devices are used).

3.4.7.1 Requirements for installation

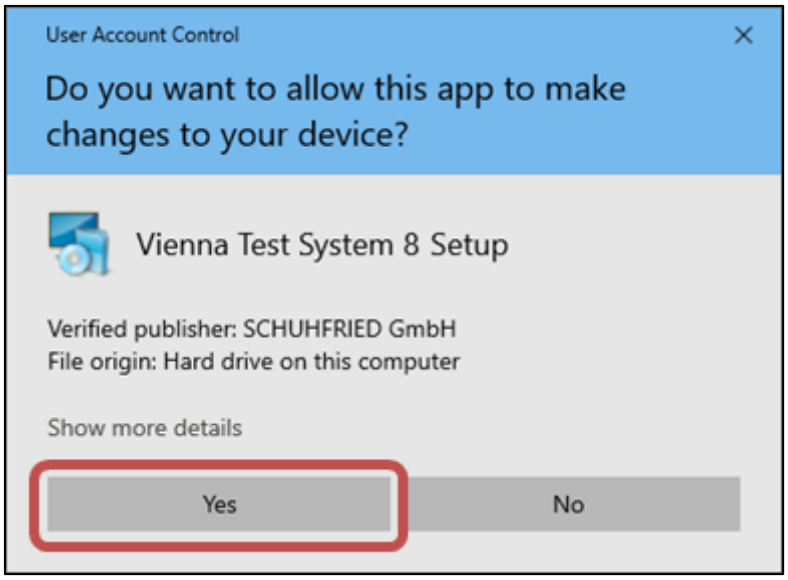
- The system requirements are met.
- You have administrator rights.
- All ports required for communication with the server are enabled and not blocked:
  - When using the default settings in the server installation, these are: 7001, 7011, 7012, 7013, 7014, 7015, 7016, 7017, 7018
  - If using custom ports: all custom ports specified during server installation.
- All Windows updates have been installed, no updates are pending.

Make sure your system meets the requirements and restart your system before starting the installation.

3.4.7.2 Installing the client software

1. **Starting the setup**
   a. Start the PC and log in with a user who **has local administrator rights**.
   b. Download the setup (approx. 600 MB) using the link provided in the email you received from SCHUHFRIED after your purchase. The setup is delivered as a .zip file. Unzip the file into a folder. The file path to the folder should not be too long (e.g., *C:\WTS_Setup*).
   c. If the setup is on a USB stick, connect the USB stick and open the drive.
   d. Start the installation by double-clicking on the file **ClientSetup.exe**.

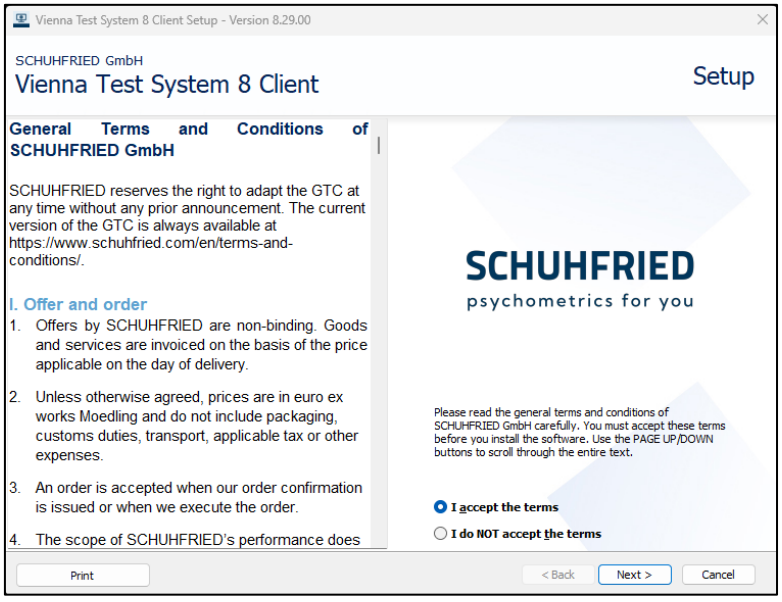
e. Confirm the Windows security prompt (*User Account Control*) by clicking *Yes*.



2. Accept the general terms and conditions

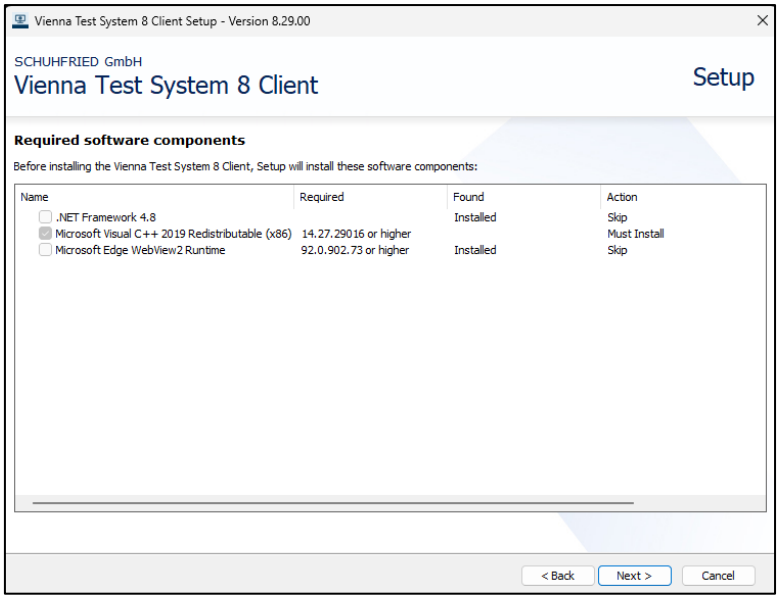
a. Please read through the general terms and conditions

b. Select *I accept the terms* and confirm with *Next*



3. Check required software components and install if necessary

a. The setup program will now check which software components need to be installed. Depending on your operating system and existing installations on your PC, different programs may be required. Once the system check is complete, a list of the programs to be installed will be displayed. Please do not make any changes.



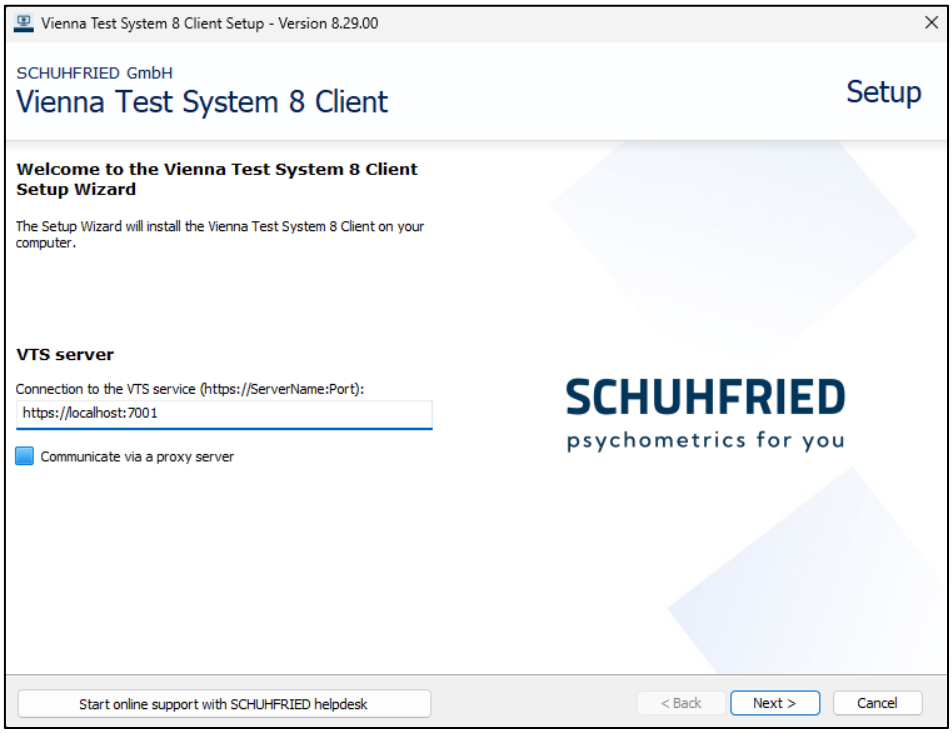
Note: If all required programs are already installed, this page will be skipped.

b. Press *Next.*

4. Specify connection data

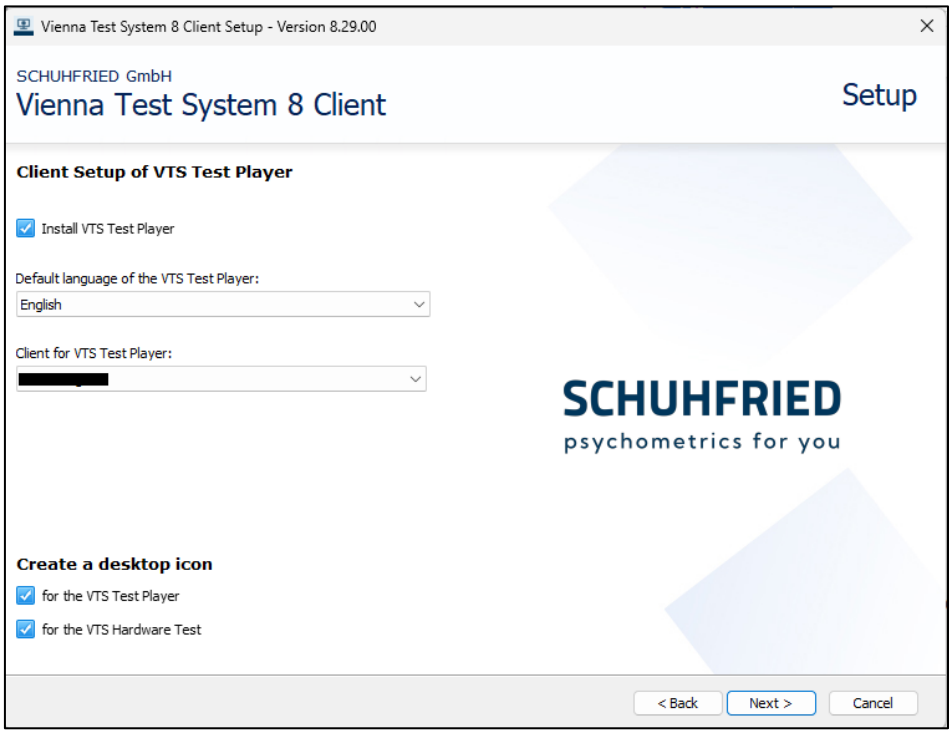
a. In the next step, you must specify the connection data for the VTS server. Enter the **name** (or IP address) of the server and the **port of the service**. The format for the server address is: `https://SERVERNAME:PORT`, e.g.: `https://WTSSERV:7001`

b. If a proxy server is used, select the *Communicate via a proxy server* checkbox and enter your configuration.



5. **Selecting the client programs**

   a. In the first step, select whether you want to install the VTS Testplayer Client.



   b. The following options can then be entered:

      i. Default language of the VTS Testplayer: This language is independent of the test language used.

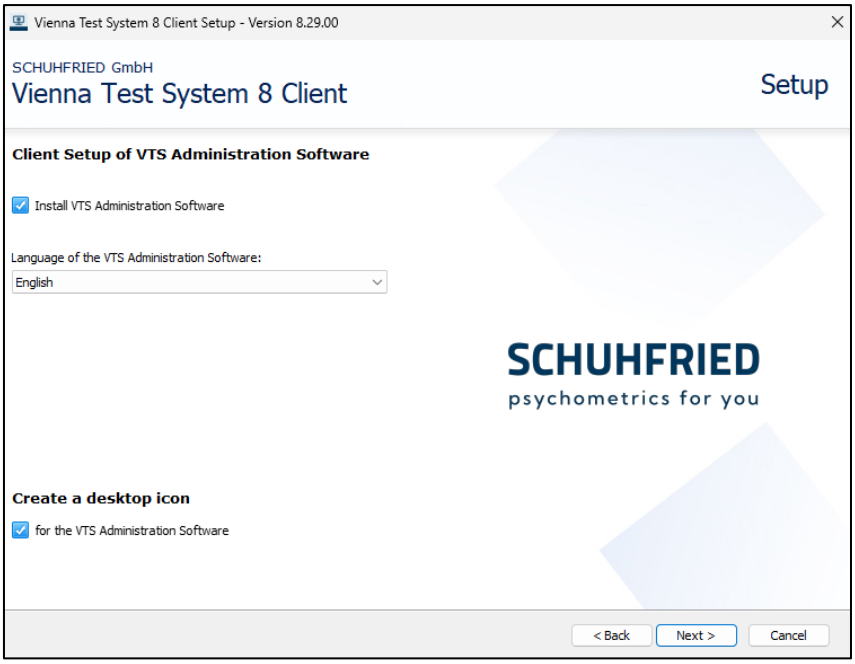
      ii. Multi-client for VTS Testplayer: Here you can set whether a fixed multi-client should be used or whether the multi-client should be requested each time the Testplayer is started.

      iii. Icons on the desktop:

         1. VTS Testplayer for Direct Testing
         2. Hardware test to check the connected SCHUHFRIED peripheral devices on the client.

   c. After clicking *Next* select whether you want to install the VTS Admin Client.

      i. You can set the default language and decide whether an icon should be created on the desktop.

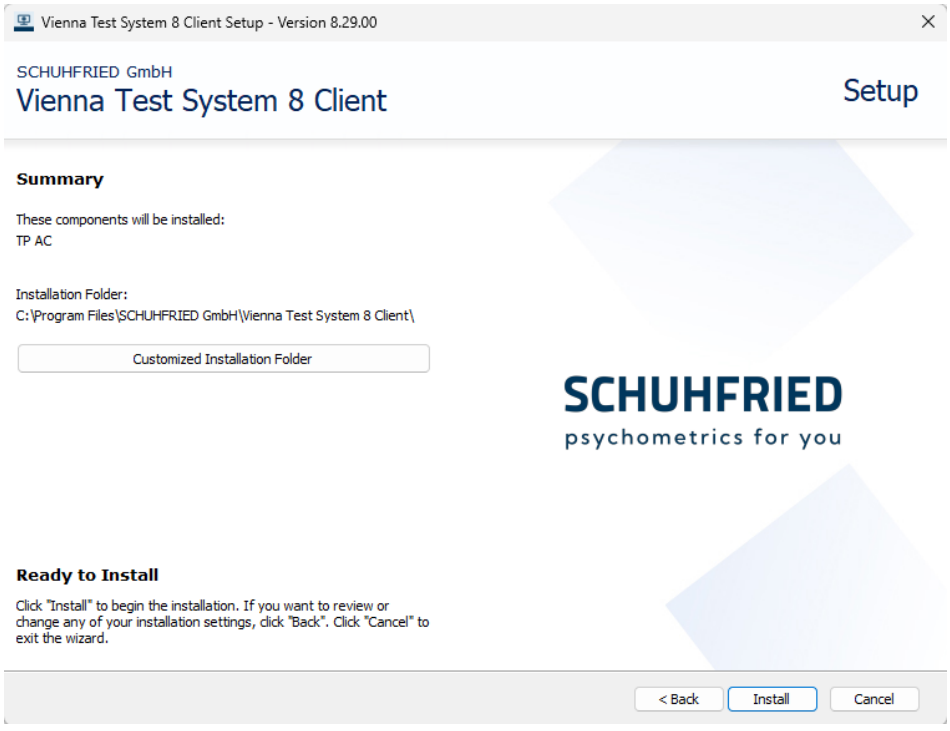


6. Starting the installation

a. You will see a summary of the selected settings.
TP: Testplayer
AC: Administration software

b. If necessary, select the desired installation folder using the *Customized Installation Folder* button.

c. To start the installation, press *Install*.



d. The installation will be carried out.

e. If the installation was successful, a confirmation message will appear. Confirm with *Finish*. The installation is now complete. You will find entries for starting the respective programs on the desktop and in the start menu.

3.4.7.2.1 Notes on installing the VTS clients

- If you install **only** the administration software, you will not be able to start any tests, not even directly from the administration software. To be able to start a test, you **also** need to install the VTS Testplayer Client.
- If you are using a proxy server, these settings will be adopted from the global proxy settings in Windows. However, this only applies if the proxy server is located between the computer where client installation is running and the computer where the server is installed.
- If the *WTS Service* can be reached at a user-defined address in the network, the Testplayer can be started with the "-s" parameter, e.g.: WTSTestplayer.exe -s https://localhost:7000/. With the "-s" parameter, the same Testplayer Client can be used for testing with a different VTS than the default system. Please note that this functionality is only supported within the same VTS version and cross-version functionality is not supported.
- The VTS clients can also be installed via command line. For details, see the page: Installing the VTS clients via the command line

3.4.7.2.2 Notes on updating from earlier VTS versions

Up to and including VTS version 8.28, there was a third client program, the *Control Monitor*. This had to be installed as separate client software. Starting with VTS version 8.29, the functionality of the *Control Monitor* is integrated into the Vienna Test System by default through the *Progress Monitor component*. The *Progress Monitor* can be accessed in the administration software (also in VTS online) via *Tools → Progress Monitor*. No additional installation or configuration is necessary.

Note on updating
If you update from VTS version 8.28 or earlier to VTS version 8.29 or later, the separate *Control Monitor* client software will be automatically uninstalled. Please use the integrated *Progress Monitor* in the VTS afterwards.

3.4.7.3 Installing the VTS clients via the command line

The VTS clients, e.g. the VTS Admin Client (AC) or the VTS Testplayer (TP), can also be installed via the command line. With this type of installation, no visible setup is started. All required parameters are transferred via the installation command.

3.4.7.3.1 Installation command

The installation command has the following structure:

```
ClientSetup.exe    /qx
         INSTALL_AC=1 LANGUAGE_AC=de-DE
         INSTALL_TP=1 LANGUAGE_TP=de-DE MANDANT_ID=AUTO
         WTS_SERVICE_BASE_ADDRESS=https:|//XX.XX:7xxx
```

3.4.7.3.1.1 Explanation of parameters

The possible parameters are:

Parameter	Value	Description
/qx	1. qr 2. qb 3. qn	1. Display installation progress enabled 2. Display installation progress as progress bar only (without details) 3. Do not display installation progress
INSTALL_AC **INSTALL_TP**	1 or 0	If one of these parameters is set to “1”, the administration software (AC) or the Testplayer (TP) is installed. If a parameter is set to “0”, the corresponding software is not installed. If the AC or TP is installed, the **“WTS_SERVICE_BASE_ADDRESS” must** be specified. The default language must also be set for the component to be installed (see below).
WTS_SERVICE_BASE_ADDRESS	Text	**Address of the WTS Service and port** through which the clients communicate with the server. These parameters are absolutely necessary when TP or AC are installed, e.g. WTS_SERVICE_BASE_ADDRESS=https:|//WTSSERV:7001
LANGUAGE_AC **LANGUAGE_TP**	Text	The language in which the administration software or Testplayer is installed. The available languages are listed below.
MANDANT	Text	Optional parameter – Client name: If this option is specified, the client setup does not attempt to resolve the client via the server installation, so that the client setup can be installed independently of the server setup. If this parameter is specified, it is not necessary for the server to be accessible. The parameter also accepts an empty string (“”).
MANDANT_ID	Text	This parameter can be used to set the client with which the Testplayer should start (e.g. W12345_001). If “AUTO” is entered, the first client found on the server is selected. If the client is to be entered at each start, **MANDANT_ID=“-”** must be specified!
RUN_CLIENT_SETUP	0	The execution of the client setup is suppressed.
ICON_AC **ICON_TP** **ICON_HWT**	0 or 1	Determines whether the corresponding desktop icons are installed. During the Testplayer installation, you can specify whether an icon for the hardware test (ICON_HWT) should be created in addition to the Testplayer icon.
CACHE_DIRECTORY	Text	Specifies the path where the cache for the administration software and the Testplayer should be created. Example: CACHE_DIRECTORY="d:\temp\schuhfried"

Parameter	Value	Description
/exelang	1031 or 1033	1031: starts the setup in German 1033: starts the setup in English This parameter is optional.

3.4.7.3.1.2 Examples

Installation of the administration software with icon in English:

```
ClientSetup.exe /qr INSTALL_AC=1 ICON_AC=1 LANGUAGE_AC=en-US
WTS_SERVICE_BASE_ADDRESS=https:|//192.168.0.113:7001
```

Installation of the Testplayer in German including icons for Testplayer and hardware test:

```
ClientSetup.exe /qr INSTALL_TP=1 ICON_TP=1 ICON_HWT=1 LANGUAGE_TP=de-DE
MANDANT_ID=AUTO
WTS_SERVICE_BASE_ADDRESS=https://WTS_SERVER:7001
```

Installation of the Testplayer in German, with icon for the Testplayer, with a specific multi-client:

```
ClientSetup.exe /qr INSTALL_TP=1 ICON_TP=1 LANGUAGE_TP=de-DE
MANDANT_ID=W12345_003 WTS_SERVICE_BASE_ADDRESS=https://WTS_SERVER:7001
CACHE_DIRECTORY="D:\Temp\Schuhfried"
```

Installation of the Testplayer in English, with icon for the Testplayer, without specific client:

```
ClientSetup.exe /qr INSTALL_TP=1 ICON_TP=1 LANGUAGE_TP=en-US
WTS_SERVICE_BASE_ADDRESS=https://WTS_SERVER:7001
MANDANT_ID=
```

3.4.7.3.1.2.1 Uninstalling

The clients can also be uninstalled via command line. Depending on the operating system, the following command can be used:

```
msiexec /uninstall wts8clientsetup.msi /quiet
```

```
msiexec /uninstall wts8clientsetup.x64.msi /quiet
```

3.4.7.3.1.3 Notes on use

- The addresses of the VTS server can be specified either as IP addresses or as domain names.
- If the client is to be selected **each time the** Testplayer is started, the value for “MANDANT_ID” must be omitted.
- Double quotation marks around the values of a property are not necessary, but are permitted (e.g. DEFAULT_CULTURE=”en-US”). However, it is not possible to assign an empty value to a property (except for MANDANT_ID), e.g.

TP_PROP="" or LANGUAGE_TP= is not permitted and will result in incorrect processing.

- It is important that the VTS server and port are specified correctly and that the service on the server is accessible during installation. The installation will run even if the server is not accessible, but it will not be successful!
- The default value 0 can also be explicitly specified for the parameters INSTALL_xx and ICON_xx. This means that the respective component or icon will NOT be installed (e.g. INSTALL_TP=0).
- Since a double slash (//) is a reserved character string in the command line, the | character must be placed in front of it. This particularly affects URL entries that begin with https://.... Therefore, https:|//my-domain:7001 must be written instead of https://my-domain:7001!
- If specified, the parameter /exelang must be in the first position.

3.4.7.3.1.4 Available languages

The following languages are available for the parameters LANGUAGE_AC and LANGUAGE_TP:

Language	Code
Chinese – Simplified	zh-CN
German	de-DE
English (USA)	en-US
French	fr-FR
Italian	it-IT
Dutch	nl-NL
Polish	pl-PL
Portuguese	pt-PT
Hungarian	hu-HU
Romanian	ro-RO
Russian	ru-RU
Swedish	sv-SE
Slovak	sk-SK
Slovenian	sl-SI
Spanish	es-ES
Czech	cs-CZ
Turkish	tr-TR

3.4.8 Updating a server/client installation

These instructions describe how to update your server/client installation to a newer VTS version.

3.4.8.1 Update requirements

- You have the installation files for the new VTS version (you will receive these either by download or from SCHUHFRIED.).
- You have the necessary licenses.
- You have administrator rights on the server on which VTS is installed.
- Sufficient free memory is available on the server.

3.4.8.2 Changes to the server hardware

Please note that an existing software dongle will remain in place when the VTS is updated. Therefore, the properties of a server (virtual system or hardware server) must not be changed. If the virtual system is “moved”, the software dongle will become invalid and your VTS will be locked. For more details, please contact SCHUHFRIED support **before making any changes to the server**.

The following properties of the server **must remain the same** for the software dongle to remain valid:

- Virtual MAC address
- CPU properties
- UUID (Universal Unique Identifier) of the virtual image; the UUID is generated by the virtualization software. When a clone is created, a new UUID is generated.

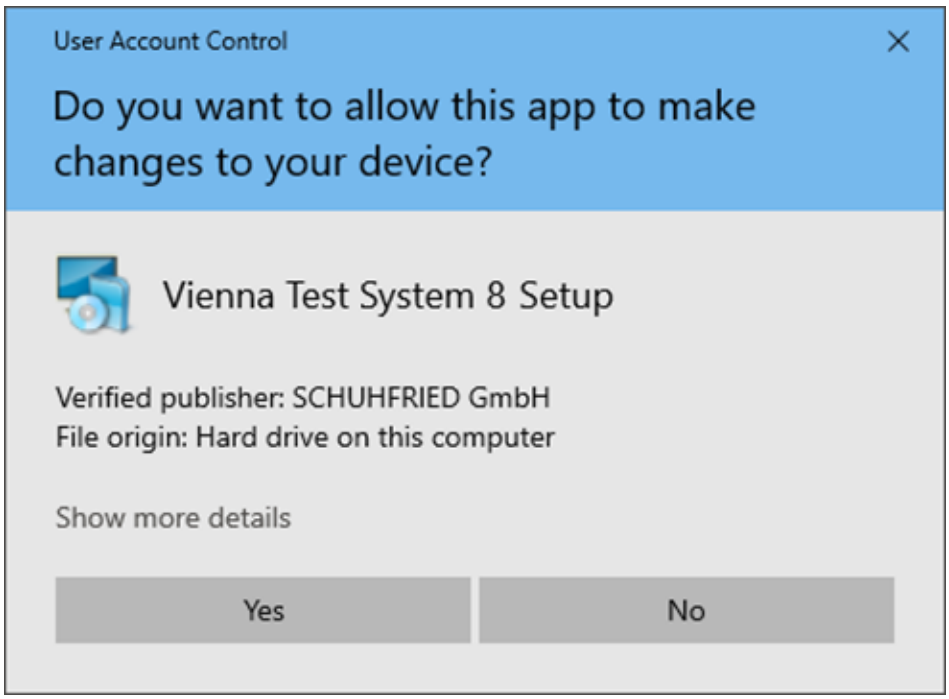
3.4.8.3 Update when a customized SQL server was used

If the supplied SQL Server Express was **not** used during installation, the SQL database must be updated manually. The corresponding instructions can be found here: Manual update of the VTS SQL database.

3.4.8.4 Performing the update

If you are using VTS client programs, please note that you must first update the server on which the VTS administration software is installed and only then update the PCs on which the clients are installed!

1. Perform a **backup**: Backup & recovery of the VTS .
2. **Start the update**
    a. Start the server and log in with a user **who has local administrator rights**.
    b. Download the setup for the new VTS version (approx. 5 GB) using the link provided in the email you received from SCHUHFRIED after your purchase. The setup is delivered as a .zip file. Unzip the file into a folder. The file path to the folder should not be too long (e.g. *C:\WTS_Setup*).
    c. If the setup is on a USB stick, connect the USB stick and open the drive.
    d. Start the installation by double-clicking on the file **Wts8Setup.exe**.
    e. Confirm the Windows security prompt (*User Account Control*) by clicking *Yes*.



3. **Follow the installation program**
    a. During the update, the installation program must be run as described on the page Server/client installation.
4. **Update the client programs**
    a. Please have the **IP address (or name) of the server** ready for the client update, as you will need to re-enter it during the update.
    b. If you have installed VTS client programs, run the VTS client setup for the new version on the PCs with the VTS clients installed to update them.
    c. After updating the first client, verify that the VTS is functioning properly. You can then proceed to update the remaining client systems accordingly.

When a VTS client program is started, the system checks whether the version of the VTS client program matches the version of the VTS administration software on the server. The client is not started if the versions do not match.

3.4.8.5 Troubleshooting

- If you try to update an older version of VTS, it can happen that the SQL Server version is no longer supported by the new setup. In that case manual adaptations are necessary. See the description on the page: Update from older SQL Server versions.

3.5 Integration

The Vienna Test System (VTS) can be integrated into existing IT environments and connected with other software through various interfaces. These are provided by the **VTS Integration Service (VIS)**, which enables smooth data exchange between VTS and external systems, e.g. HR management software (HRMS) or hospital information systems. Several plug-ins are provided, tailored for different integration needs. VIS automatically loads when the system starts and runs in the background as a separate process alongside the VTS.

VIS can be configured after VTS installation, provided the required licenses are available (see the section *license information* below). Each plug-in includes its own setup guide. In addition to VIS, the VTSCommand Tool provides several functions related to archiving, cleanup and certificate management.

> In older versions of VTS, it was necessary to explicitly activate VIS using a .bat script. This is not needed anymore, VIS is installed automatically with VTS.

3.5.1 Available VIS plugins

3.5.1.1 REST API plugin

The **REST API plugin** offers a general HTTP REST interface for integrating VTS with external applications. It is available in both **VTS Online** and **VTS Offline**.

For more detailed information about the plugin, refer to REST API plugin.

3.5.1.2 GDT plugin

The **GDT Plugin** establishes a GDT interface between the **VTS** and an **external system**. Data exchange is handled through a **file-based mechanism**.

For more detailed information about the plugin, refer to GDT plugin

3.5.1.3 HL7 plugin

The **HL7 Plugin** establishes a HL7 interface between the **VTS** and an **external system**. Data exchange is handled through a **file-based or TCP-based mechanism**.

For more detailed information about the plugin, refer to HL7 plugin

3.5.1.4 Universal Plugin

The **Universal Plugin** provides a **SOAP 1.2 Web Service** that enables an **external system** to communicate with **VIS**. It supports key operations related to **person records** and **test results**.

For more detailed information about the plugin, refer to Universal plugin

3.5.2 VTSCommand tool

VTSCommand is a command-line utility designed to export and save test results from the **Vienna Test System (VTS)** as `.xstp` archive files. This tool requires Universal Plugin to be configured and running in order to perform archiving operations.

In addition to archiving, the tool offers the following capabilities:

- **Result Cleanup:** Optionally deletes all archived test results.
- **Person Cleanup**: Optionally deletes person records from the VTS if all associated test results have been successfully archived, if no test results exist, or if only unfinished tests are present.

- **Certificate Management**: Allows replacement of the service's certificate with a different **X.509 certificate** to be used by the VTS.

For more detailed information about the tool, refer to the VTSCommand tool

3.5.3 License information

VTS Integration Service (VIS) license is required to run VIS and its plugins. This license is separate from the Vienna Test System administration software license and is mandatory for the service to operate. In addition, HL7 plugin requires dedicated license to load and function. The following table provides an overview of the required licenses for the various plugins.

Plugin/Tool	Required license
REST API plugin	VIS license
GDT plugin	VIS license
HL7 Plugin	Dedicated HL7 plugin license
Universal plugin	VIS license
VTSCommand tool	VIS license needed for archiving functionality. No license needed for certificate management.

3.5.4 REST API plugin

The **REST API plugin** offers a general HTTP REST interface for integrating VTS with external applications. It is available in both **VTS Online** and **VTS Offline**.

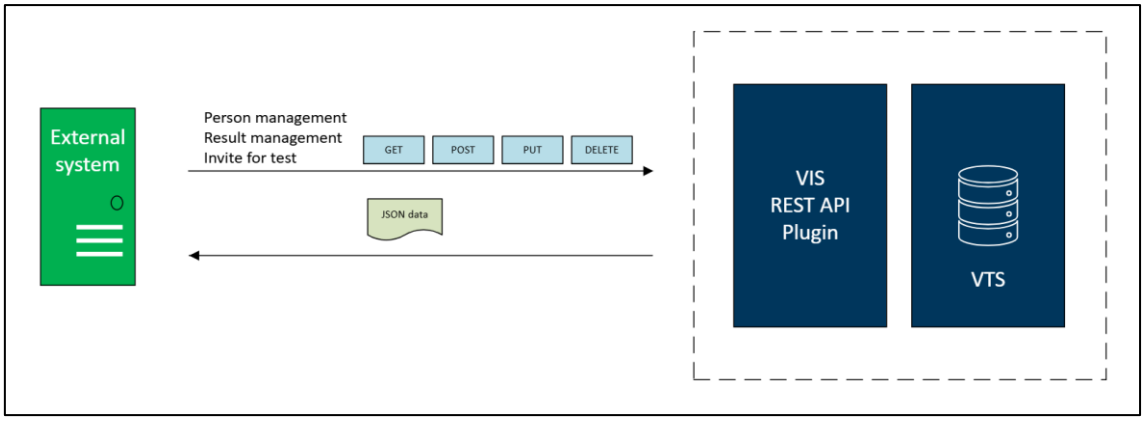
> The REST API plugin is available from VTS version 8.30. The API is currently provided free of charge; however, please note that this pricing model is subject to change in future releases. As the API continues to evolve, the interface and endpoints may be modified in upcoming versions to improve functionality and performance.

3.5.4.1 Overview of functionality

The **REST API plugin** provides endpoints for managing **person records**, **test results**, and generating **invitation links** for online testing sessions (see also: Testing).

All data exchanged via the REST API is transmitted in **JSON format**, ensuring compatibility and ease of integration with modern applications.

Access to these endpoints requires **authentication via a private token**, which is uniquely assigned to a registered VTS user. All operations performed through the REST API are securely **logged under the identity of the associated user**, ensuring traceability and accountability.



3.5.4.2 Setup and configuration

In **VTS Online**, the REST API is ready to use without additional configuration. In **VTS Offline**, it is necessary that the the plugin is properly enabled and network access is granted.

Here is a short step by step guide on how to configure a minimal working setup. For advanced options please refer to the sections below.

3.5.4.2.1 1. Adapt the VIS settings file (VTS Offline only)

The REST API plugin must be enabled and configured in the VIS settings file by default located in `C:\Program Files\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`
Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

This file contains the configuration of all available VIS plugins. All settings relevant to the REST API plugin can be found under the section starting with “RestApiPlugin”.

```
"RestApiPlugin": {
  //...
}
```

3.5.4.2.1.1 1.1. Enable the REST API plugin

In order to use the REST API plugin, ensure the value of the `Enabled` property is set to `true` (it is enabled by default).

```
"Enabled": "true",
```

3.5.4.2.1.2 1.2. (Optional) Configure a custom port

If a port different to the standard one shall be used to listen to incoming requests, it needs to be changed in a setting named “Url”, located in “RestApiPlugin/Kestrel/Endpoints/Http/Url“ and “RestApiPlugin/Kestrel/Endpoints/HttpsInlineCertStore/Url“, the latter being the https endpoint. Please note that the http endpoint always redirects to the https endpoint.

```
"RestApiPlugin": {
  "Enabled": "true",
  "CertificateSearchKind": "FindBySubjectName",
  "CertificateSearchValue": "SchuhfriedSelfSignedCertificate",
  "Kestrel": {
```

```
    "EndPoints": {
      "Http": {
        "Url": "http://localhost:9011"
      },
      "HttpsInlineCertStore": {
        "Url": "https://localhost:9012"
      }
    }
  }
},
```

3.5.4.2.1.3 1.3. Apply changes

⚠ After saving changes to the settings file, you must restart the Windows service “WTS Service” for the system to apply the updates and load the plugin with the new configuration. If you are unsure how to restart a Windows service, you may also reboot your machine.

3.5.4.2.2 2. Ensure network access (VTS Offline only)

The VTS REST API service listens on port **9012** by default. In environments with active firewalls (e.g., Windows Defender), this port is restricted to local traffic. To enable connectivity for integrated applications, ensure your network rules permit traffic through port 9012.

> To maintain a secure environment, we recommend restricting access to this port to specific IP addresses rather than opening it to the entire network.

3.5.4.2.3 3. Test your setup

3.5.4.2.3.1 3.1. Verify service operation

To ensure that the plugin is operational, visit the URL `https://{VIS Service host and port}/api`:

- For **VTS Online** the URL is: https://vis.schuhfried.com/api
- For **VTS Offline,** on the **host machine**, the URL is: https://localhost:9012/api or `https://your_fully_qualified_domain_name:9012/api`

In case the API is working, you should see the text “*Hello from the REST API...*“.

As a programmatic interface, the REST API is designed to be accessed via custom client applications or development tools like Postman and cURL. To get started with your first connection, follow the detailed integration guides provided in the sections below.

3.5.4.2.3.2 2.3. Troubleshooting

In case of any problems, you may check the log files for any hints about what could be wrong (see: REST API plugin)

- **The /api URL cannot be reached in browser**
  - A firewall may block incoming connections to the configured port. Ensure that incoming connections on the specified port are accepted.
  - Verify that the configured port matches the port used in the URL
  - Ensure the “WTS Service” has been restarted and all settings are correctly applied
- **Messages are terminated with 401 or 403 HTTP status codes**

    - Ensure that messages are properly authenticated (see below)
- **Messages are terminated with error status codes**
    - Ensure that there are no inconsistencies in your data, e.g. malformed fields or a reference to a non-existing test battery.
    - Check the logs for information about possible issues.

3.5.4.3 Authentication and Connectivity

All API calls must be **authenticated using a generated access token**. The REST API supports **multiple authentication methods**, allowing flexibility based on integration needs:

- Pass the token in the `X-API-KEY` **header**
- Use the token as a **Bearer token** in the `Authorization` header
- Optionally, use the token as the **password value in Basic Authentication**

Choose the method that best fits your application's security and integration requirements.

> HTTP status code 401 Unauthorized is returned when an API call is made without valid authentication. This indicates that the access token is missing, invalid, or expired.

3.5.4.3.1 Generating an access token

Access tokens for the REST API can be generated directly in the **Vienna Test System** on the **user detail page**.

To generate a token:

1. Navigate to the **detail page** of the desired user.
2. Click on the **three dots** next to the assigned environment.
3. Select the option **“API access tokens”** from the menu.
4. A window will appear where a new token can be generated.
5. Click on the **“Generate access token”** button to create a new token.

> The **token value must be copied immediately** after generation, as it will **not be displayed again**.

It is not possible to generate multiple tokens for the same user.

3.5.4.3.2 Token expiration and revocation

A newly generated token is valid for 12 months. Once the token expires, it can no longer be used for authentication and must be replaced with a new one.

VTS does not offer token rotation with overlapping tokens.

A token can be permanently deleted in the same window where it was generated. If a new token is created afterward, it will be different from the previous one.

3.5.4.4 API Reference

The base URL of the REST API is `https://{VIS Service host and port}/api`:

- For **VTS Online** the URL is: https://vis.schuhfried.com/api
- For **VTS Offline,** on the **host machine**, the URL is https://localhost:9012/api or `https://your_fully_qualified_domain_name:9012/api`

3.5.4.4.1 OpenAPI specification (Swagger)

The available endpoints and schema definitions are documented in the form of an **OpenAPI** specification (commonly referred to as **Swagger** file). The actual file for your setup can be obtained via the URL `https://{VIS Service URL}/swagger/v1/swagger.json`

- For **VTS Online** the URL is: https://vis.schuhfried.com/swagger/v1/swagger.json
- For **VTS Offline,** on the **host machine**, the URL is: https://localhost:9012/swagger/v1/swagger.json or `https://your_fully_qualified_domain_name:9012/swagger/v1/swagger.json`

While the OpenAPI specification contains all available endpoints and their data types, the following sections give an overview of the functionality and some additional guidance.

3.5.4.4.2 Person management

The **person management endpoints** in the REST API plugin support the standard HTTP methods: **POST**, **GET**, **PUT**, and **DELETE**, each corresponding to specific operations:

- **POST**: Creates a new person record in the system using the data provided in the request body (in **JSON format**). Each person is identified by a **unique external ID**. If no external ID is supplied, the system automatically generates one. The response includes the full data of the newly created person.
- **GET**: Retrieves the personal data of a person specified by their unique external ID. The response contains the complete person record in JSON format.
- **PUT**: Updates the fields of an existing person identified by their unique external ID, based on the data provided in the request body. The updated person record is returned in the response.
- **DELETE**: Permanently removes the person identified by the unique external ID. **Deleted data cannot be recovered.**

The person management additionally includes an endpoint that returns the **IDs of all test sequences and completed results** associated with a specific person. This allows clients to efficiently **identify which results are available for export** or further processing.

All data transmitted through these endpoints is formatted as **JSON**, ensuring consistency and ease of integration.

3.5.4.4.3 Result management

The **result management endpoints** support exporting data in multiple formats: **PDF**, **CSV**, and **template-based Word reports**. Users can export data for a **single result** or for an **entire test sequence**. Additionally, both individual results and full test sequences can be **deleted** via the API.

The export process is implemented as a **two-step asynchronous operation**:

1. **Initiation**: The client initiates the export by specifying the target item and desired format. The API responds with a unique **export ID** and begins preparing the data asynchronously.
2. **Download**: The client uses the export ID to request the prepared file. If the file is not yet ready, the API returns HTTP status code `202 Accepted`. Once the file is available, the API returns the **file stream** for download.

PDF exports of result data are generated using the same **norms**, **language**, and **display settings** as configured for the **user associated with the authentication token** in the Vienna Test System application or portal.

If a PDF with different language, norm, or display configuration is required, the user can conveniently **log in to the application**, open any result of the same test, and **adjust the configuration**. The PDF exported via the API will **fully match** what the user sees in the user interface.

3.5.4.4.4 Invite to a test (create test links)

The **REST API plugin** includes an endpoint for generating **test links** for online testing. Using test links, persons can start testing in the VTS in open or proctored mode (see: Testing for more information). A person, identified by their **external ID**, can be invited to a specified **test battery**.

Additionally, it is possible to specify whether the system should **automatically send an email invitation** to the person. This feature requires an **email server to be configured** in offline environments (see Email configuration for open mode testing). In **VTS Online**, it works **without any additional configuration**.

3.5.4.5 Access control and security

3.5.4.5.1 Security level

The REST API enforces access control based on the **security level** of the authenticated user (see: How to add users and limit their access).

- Users with **security level 0 or 1** can perform all API actions, unless restricted by data separation based on the *department* feature (see: REST API plugin).
- Users with **security level 2** can only create new persons and invite them for testing, including sending invitation emails.
- Users with **security level 3** can create new persons and generate invitation links, but **cannot send emails**.

Action	SL0	SL1	SL2	SL3
Create new person	✓	✓	✓	✓
Generate test invitation link	✓	✓	✓	✓
Generate test invitation link and send it via e-mail	✓	✓	✓	✗
Get/Edit/Delete person	✓	✓	✗	✗
Get/Export/Delete results	✓	✓	✗	✗

3.5.4.5.2 Department

The REST API respects **data separation based on the department feature**. If a user is assigned to a department and data separation is enabled, they can only access

persons and results within the same department. However, such users can still **create new persons in any department**. See also: How to add users and limit their access.

3.5.4.5.3 HTTPS

All communication with the VTS REST API must be done over **HTTPS**. This ensures that data is securely encrypted during transmission. Any requests made via HTTP will **automatically be redirected to HTTPS** security reasons.

3.5.4.6 Error handling

The VTS REST API uses a **Result pattern** for all responses. Each API call returns an HTTP status code **200 OK**, regardless of whether the operation was successful or not.

The response includes a field `hasError` to indicate if an error occurred during processing. If an error is present, a brief description is provided in the `message` field. If no error occurred, the actual result data is returned in the `result` object.

3.5.4.6.1 Example

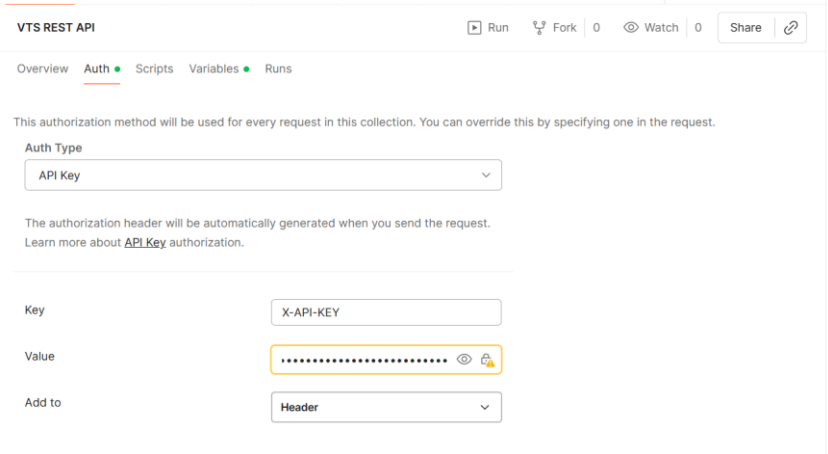
```
{
    "hasError": true,
    "message": "Person not found",
    "result": null
}
```

3.5.4.7 Examples

This section provides **example API calls using Postman**, allowing you to quickly test and explore the REST API functionality. Use these examples to verify authentication, interact with endpoints, and understand request/response formats.

3.5.4.7.1 Authentication

In the Authentication tab of the Postman workspace select Auth Type API Key. Paste the token into the value field and specify the key as X-API-KEY



3.5.4.7.2 Create new person

Make a `POST` call to `{{baseUrl}}/Persons`

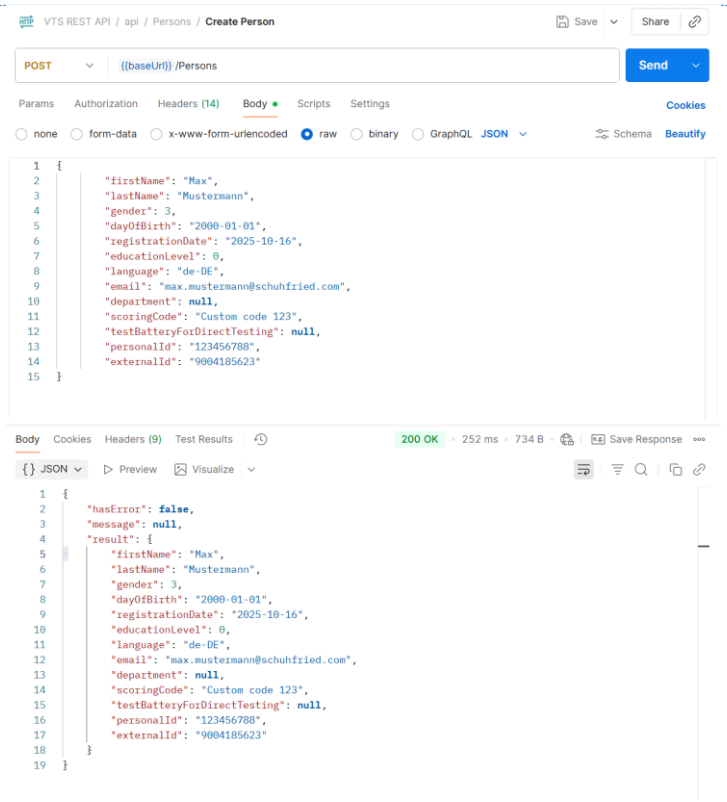
3.5.4.7.2.1 Request body

```
{
        "firstName": "Max",
        "lastName": "Mustermann",
```

```
        "gender": 3,
        "dayOfBirth": "2000-01-01",
        "registrationDate": "2025-10-16",
        "educationLevel": 0,
        "language": "de-DE",
        "email": "max.mustermann@schuhfried.com",
        "department": null,
        "scoringCode": "Custom code 123",
        "testBatteryForDirectTesting": null,
        "personalId": "123456788",
        "externalId": "9004185623"
}
```


3.5.4.7.2.2 Expected response


```
{
    "hasError": false,
    "message": null,
    "result": {
        "firstName": "Max",
        "lastName": "Mustermann",
        "gender": 3,
        "dayOfBirth": "2000-01-01",
        "registrationDate": "2025-10-16",
        "educationLevel": 0,
        "language": "de-DE",
        "email": "max.mustermann@schuhfried.com",
        "department": null,
        "scoringCode": "Custom code 123",
        "testBatteryForDirectTesting": null,
        "personalId": "123456788",
        "externalId": "9004185623"
    }
}
```

3.5.4.7.3 Delete person

Make a `DELETE` call to `{{baseUrl}}/Persons{{externalId}}`

> Deleting a person via the REST API will also permanently delete all of their associated test results. This action is irreversible and the data cannot be recovered.

3.5.4.7.4 Invite person for an online test

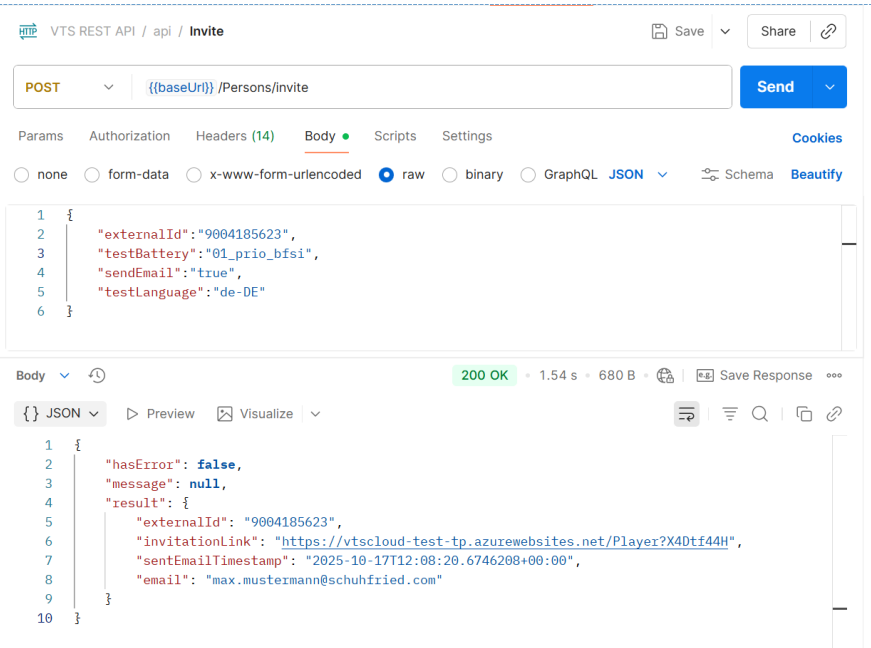
Make a `POST` call to `{{baseUrl}}/Persons/invite`. If the `POST` call is successful, the email is immediately sent.

3.5.4.7.4.1 Request body

```
{
    "externalId":"9004185623",
    "testBattery":"01_prio_bfsi",
    "sendEmail":"true",
    "testLanguage":"de-DE"
}
```

3.5.4.7.4.2 Expected response

```
{
    "hasError": false,
    "message": null,
    "result": {
        "externalId": "9004185623",
        "invitationLink": "https://vtscloud-test-
tp.azurewebsites.net/Player?X4Dtf44H",
        "sentEmailTimestamp": "2025-10-17T12:08:20.6746208+00:00",
        "email": "max.mustermann@schuhfried.com"
    }
}
```

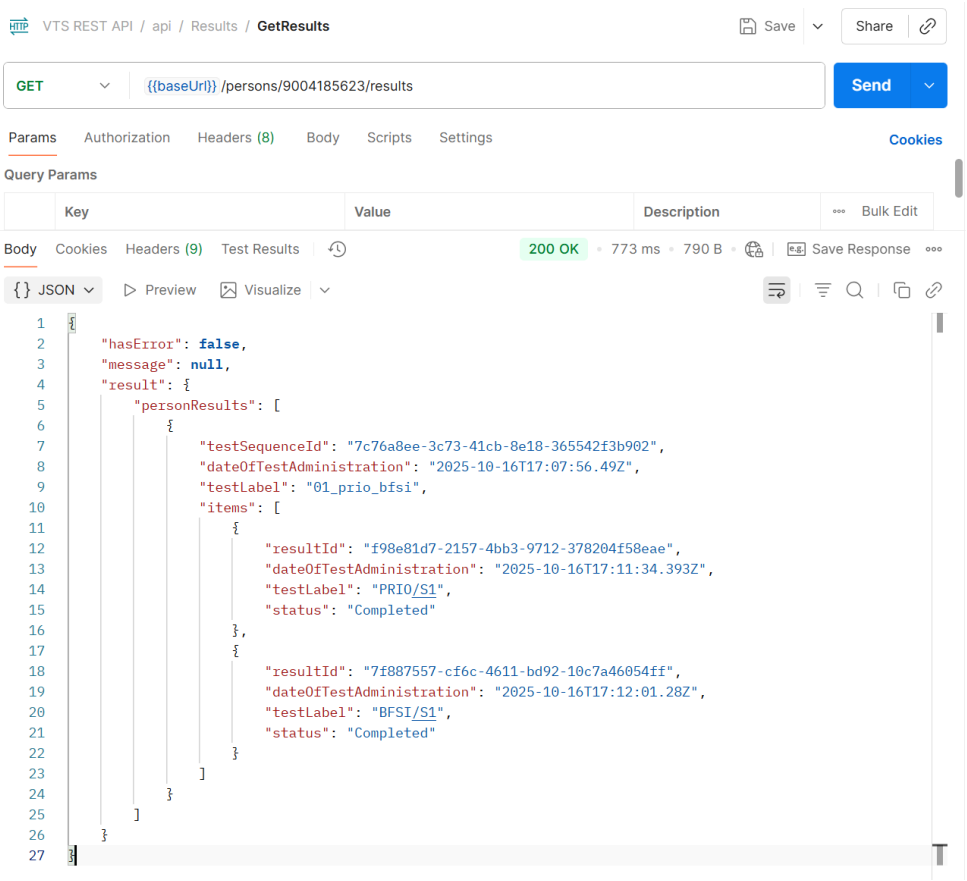


3.5.4.7.5 Get results of person

Make a `GET` call to `{{baseUrl}}/Persons/{{external id}}/results`. The response provides the status of the tests in the test sequence, the test sequence ID (`"testSequenceId"`) and the result IDs (`"resultId"`). The test sequence ID and the result IDs can be used to retrieve the results (e.g. as PDF) over the result management endpoints (see below).

3.5.4.7.5.1 Expected response


```
{
    "hasError": false,
    "message": null,
    "result": {
        "personResults": [
            {
                "testSequenceId": "7c76a8ee-3c73-41cb-8e18-365542f3b902",
                "dateOfTestAdministration": "2025-10-16T17:07:56.49Z",
                "testLabel": "01_prio_bfsi",
                "items": [
                    {
                        "resultId": "f98e81d7-2157-4bb3-9712-
378204f58eae",
                        "dateOfTestAdministration": "2025-10-
16T17:11:34.393Z",
                        "testLabel": "PRIO/S1",
                        "status": "Completed"
                    },
                    {
                        "resultId": "7f887557-cf6c-4611-bd92-
10c7a46054ff",
                        "dateOfTestAdministration": "2025-10-
16T17:12:01.28Z",
                        "testLabel": "BFSI/S1",
                        "status": "Completed"
                    }
                ]
            }
        ]
    }
}
```



3.5.4.7.6 Export single result as PDF

Export of data is done in two steps. First, an export ID is generated, which triggers the backend to start creating the file. Then, a second call is made to download the file. If the file is not ready when the second call is made, the endpoint returns HTTP status code `202 Accepted`, indicating that the request should be repeated after some time.

3.5.4.7.6.1 Trigger the export

Make a `POST` call to `{{baseUrl}}/Results/export/pdf`

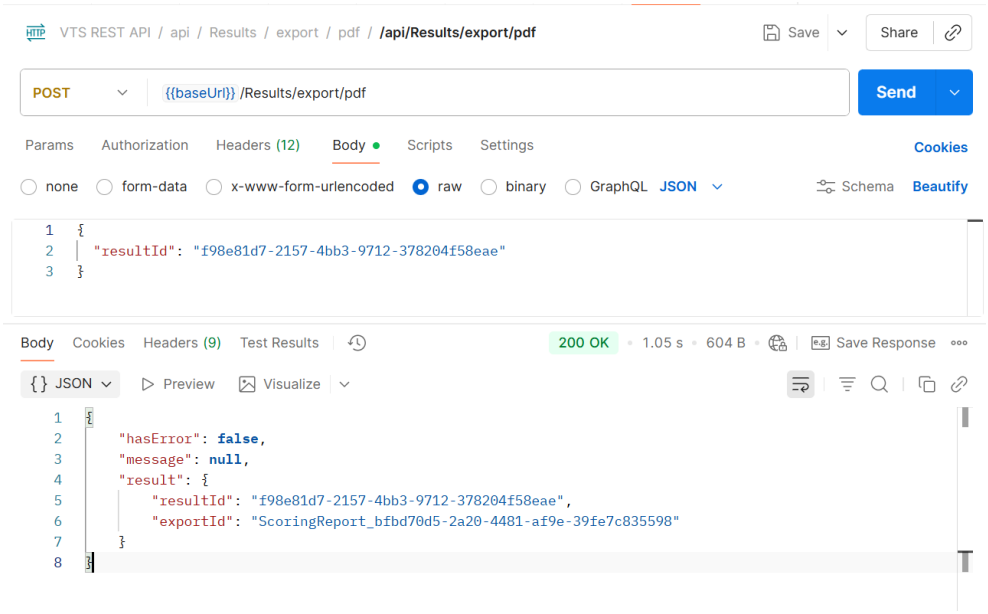
3.5.4.7.6.1.1 Request body

Use the result id of a single test result obtained from the response of the `GET` call to `/Persons/{{external id}}/results`(see above).

```
{
  "resultId": "f98e81d7-2157-4bb3-9712-378204f58eae"
}
```

3.5.4.7.6.1.2 Expected result

```
{
    "hasError": false,
    "message": null,
    "result": {
        "resultId": "f98e81d7-2157-4bb3-9712-378204f58eae",
        "exportId": "ScoringReport_bfbd70d5-2a20-4481-af9e-39fe7c835598"
    }
}
```

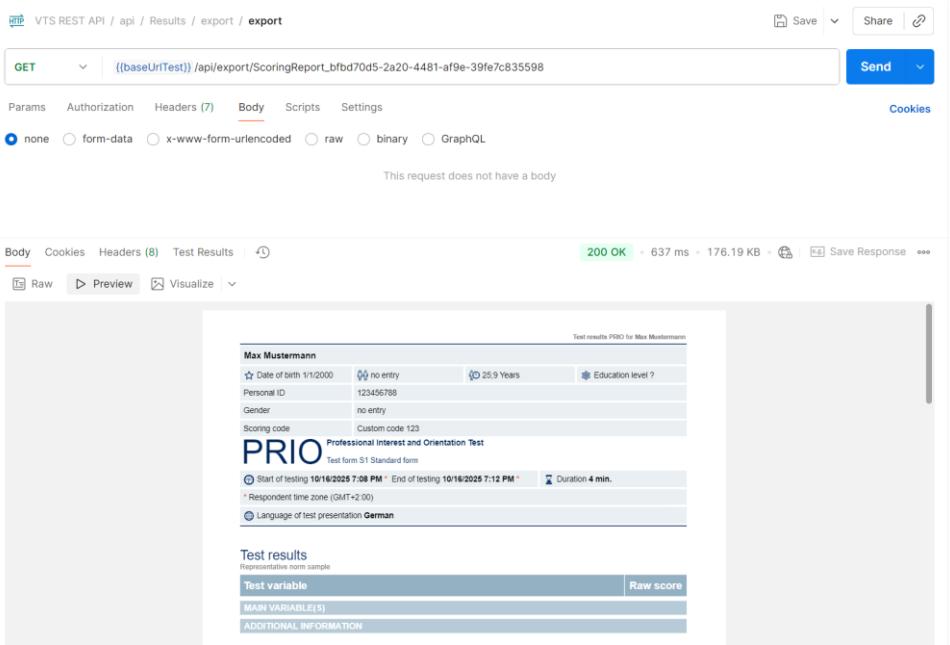


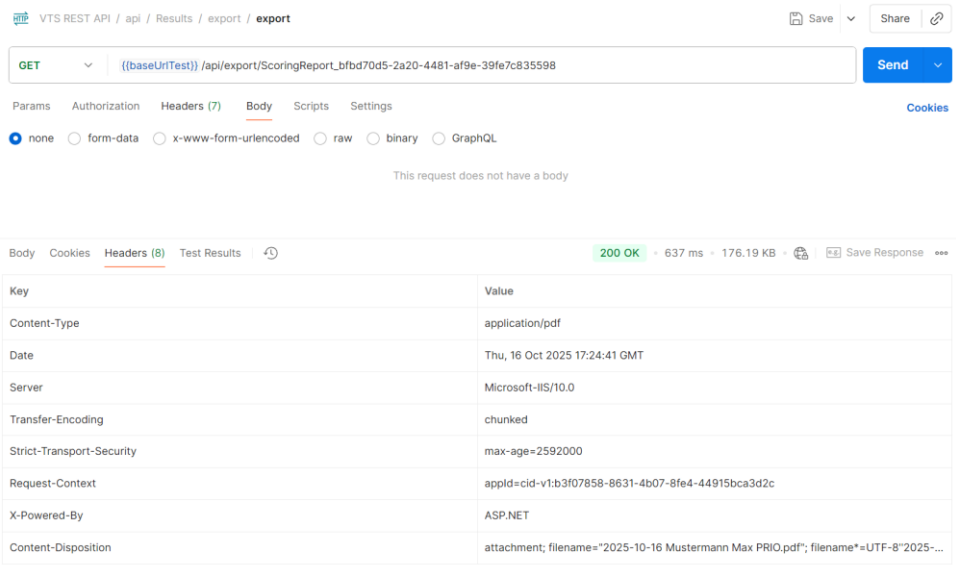
3.5.4.7.6.2 Download the file

Make a `GET` call to `{{baseUrl}}/export/{{exportId}}`, where the exportId is the value obtained from the first call to `/Results/export/pdf`

If the file is not prepared yet, the endpoint will return http code `202 Accepted`

If the file is already prepared, the endpoint will transfer the pdf for the test result. Response header Content-Disposition defines the file name.





3.5.4.7.7 Export test sequence as PDF

Export of data is done in two steps. First, an export ID is generated, which triggers the backend to start creating the file. Then, a second call is made to download the file. If the file is not ready when the second call is made, the endpoint returns HTTP status code `202 Accepted`, indicating that the request should be repeated after some time.

3.5.4.7.7.1 Trigger the export

Make a `POST` call to `{{baseUrl}}/TestSequence/export/pdf`

3.5.4.7.7.1.1 Request body

Use the ID (`"testSequenceId"`) of the whole test sequence containing one or more test results obtained from the response of the call `/Persons/{{external id}}/results`

For the `"scoringMethod"` value you have several options that can be used, depending on the test batteries you use for testing:

- Use the `"scoringMethod": "Individual Scoring"` for test sequences done by custom test batteries or test sequences done without a battery.
- Use the name of a user-defined scoring method if you are using test batteries that have a scoring created by SCHUHFRIED (BATEVA). You can find the name of the user-defined scoring method on the *test result details page* in the VTS (see screenshot below).
- If you are using an SFS Test Solution, use the name of the scoring method as shown on the *test result details page* in VTS (see screenshot below).

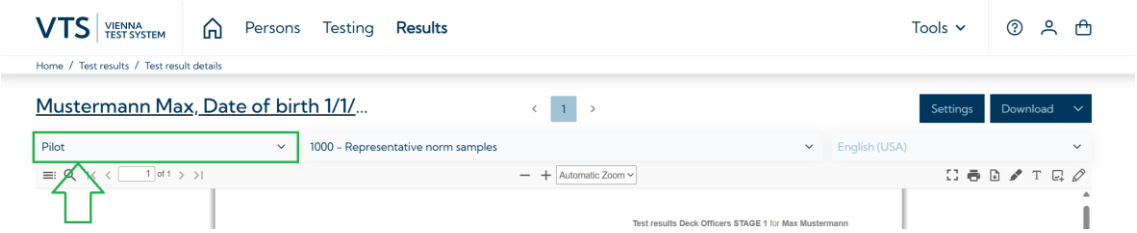


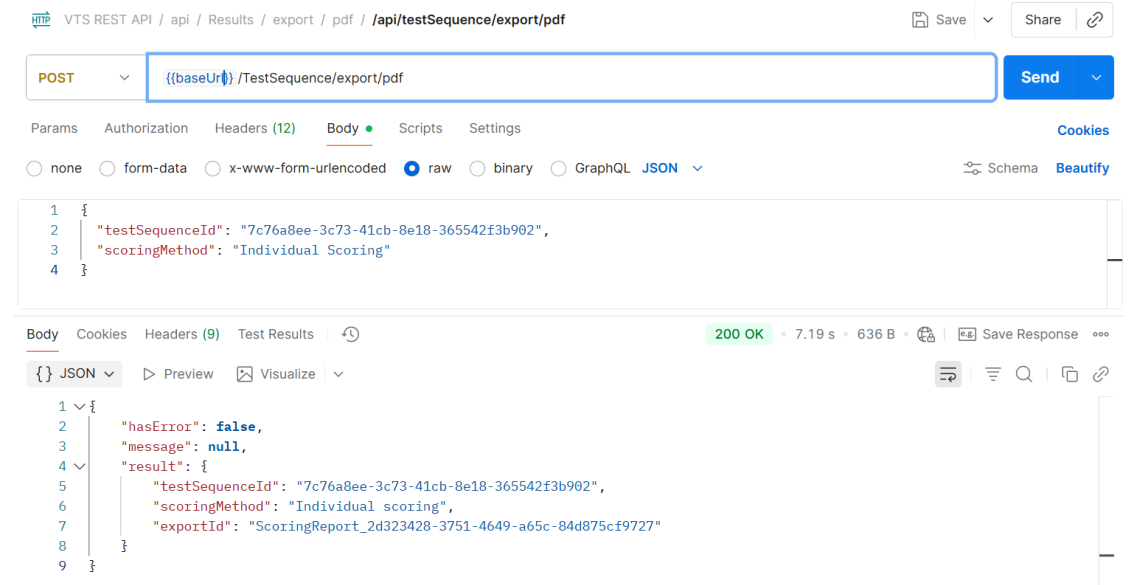
Figure 1 Example of where to find the scoring method name.

3.5.4.7.7.1.1.1 Example

```
{
  "testSequenceId": "7c76a8ee-3c73-41cb-8e18-365542f3b902",
  "scoringMethod": "Individual Scoring"
}
```

3.5.4.7.7.1.2 Expected result

```
{
    "hasError": false,
    "message": null,
    "result": {
        "testSequenceId": "7c76a8ee-3c73-41cb-8e18-365542f3b902",
        "scoringMethod": "Individual scoring",
        "exportId": "ScoringReport_2d323428-3751-4649-a65c-84d875cf9727"
    }
}
```



3.5.4.7.7.2 Download the file

Make the second call to download the exported file as described in section **Export single result as PDF** (see: REST API plugin)

3.5.4.7.8 Export result data in CSV format

Export of data is done in two steps. First, an export ID is generated, which triggers the backend to start creating the file. Then, a second call is made to download the file. If the file is not ready when the second call is made, the endpoint returns HTTP status code `202 Accepted`, indicating that the request should be repeated after some time.

3.5.4.7.8.1 Trigger the export

Make a `POST` call to `{{baseUrl}}/Results/export/csv`

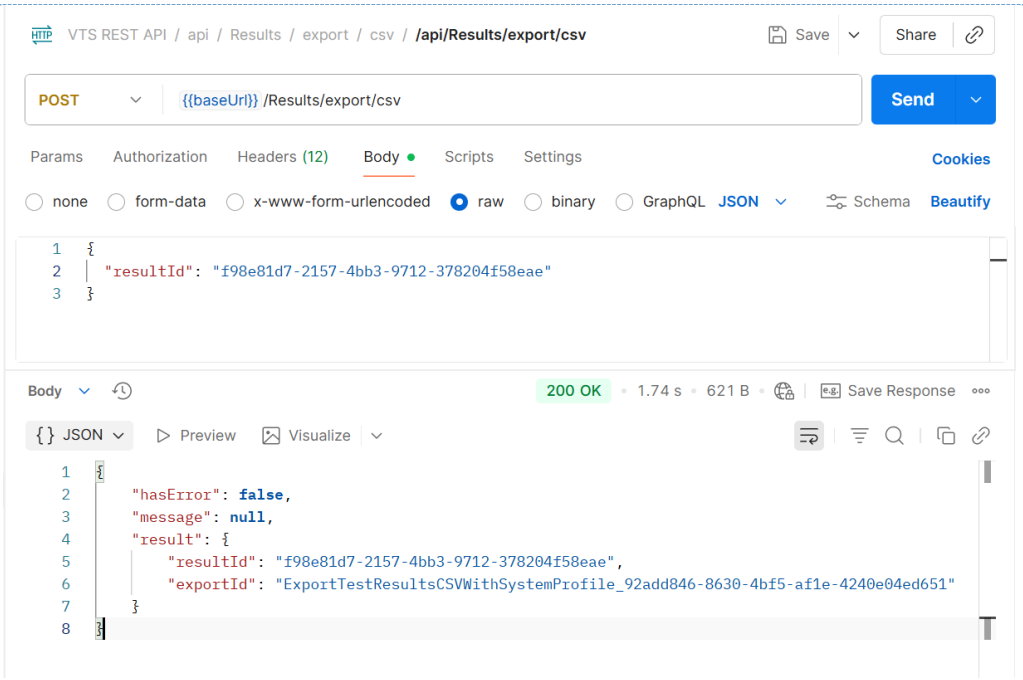
3.5.4.7.8.1.1 Request body

Use id of a single test result obtained from the response of the call `/Persons/{{external id}}/results`

```
{
  "resultId": "f98e81d7-2157-4bb3-9712-378204f58eae"
}
```

3.5.4.7.8.1.2 Expected response

```
{
    "hasError": false,
    "message": null,
    "result": {
        "resultId": "f98e81d7-2157-4bb3-9712-378204f58eae",
        "exportId": "ExportTestResultsCSVWithSystemProfile_92add846-8630-
4bf5-af1e-4240e04ed651"
    }
}
```



3.5.4.7.8.2 Download the file

Make the second call to download the exported file as described in section **Export single result as PDF** (see: REST API plugin)

3.5.4.7.9 Export a result or test sequence with a Word Report

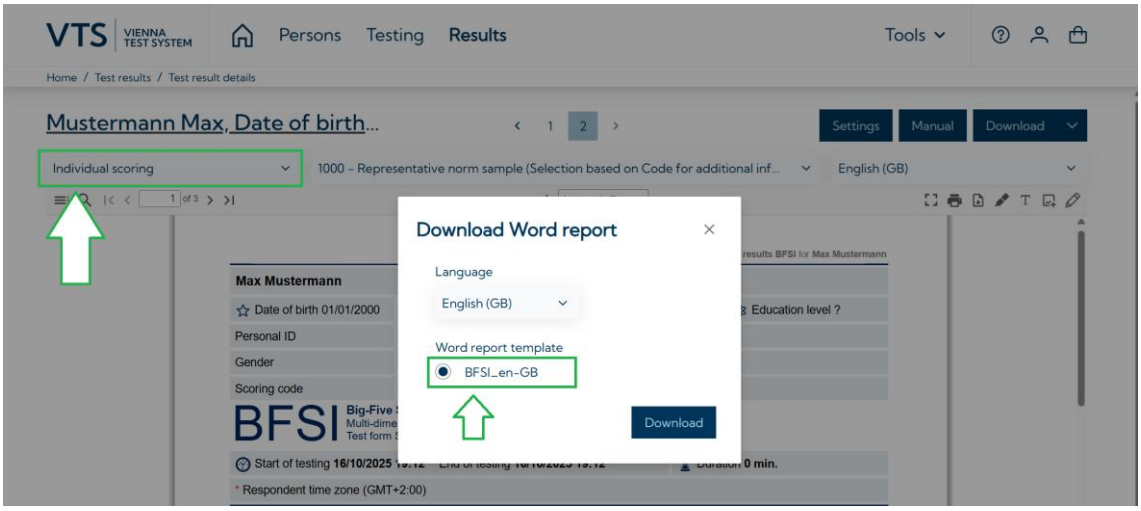
Export of data is done in two steps. First, an export ID is generated, which triggers the backend to start creating the file. Then, a second call is made to download the file. If the file is not ready when the second call is made, the endpoint returns HTTP status code `202 Accepted`, indicating that the request should be repeated after some time.

3.5.4.7.9.1 Trigger the export

Make a `POST` call to `{{baseUrl}}/results/export/word-report` to export a single test result or, to `{{baseUrl}}/api/TestSequence/export/word-report` to export whole test sequence.

To generate a Word report via the REST API, you must provide either a result ID or a test sequence ID, along with the **scoring method** and the **name of the word report template**. For more information about word reports see: Create/import/edit Word reports.

You can find both the scoring method and the template name in the Vienna Test System when generating a Word report through the user interface.



3.5.4.7.9.1.1 Request body single result

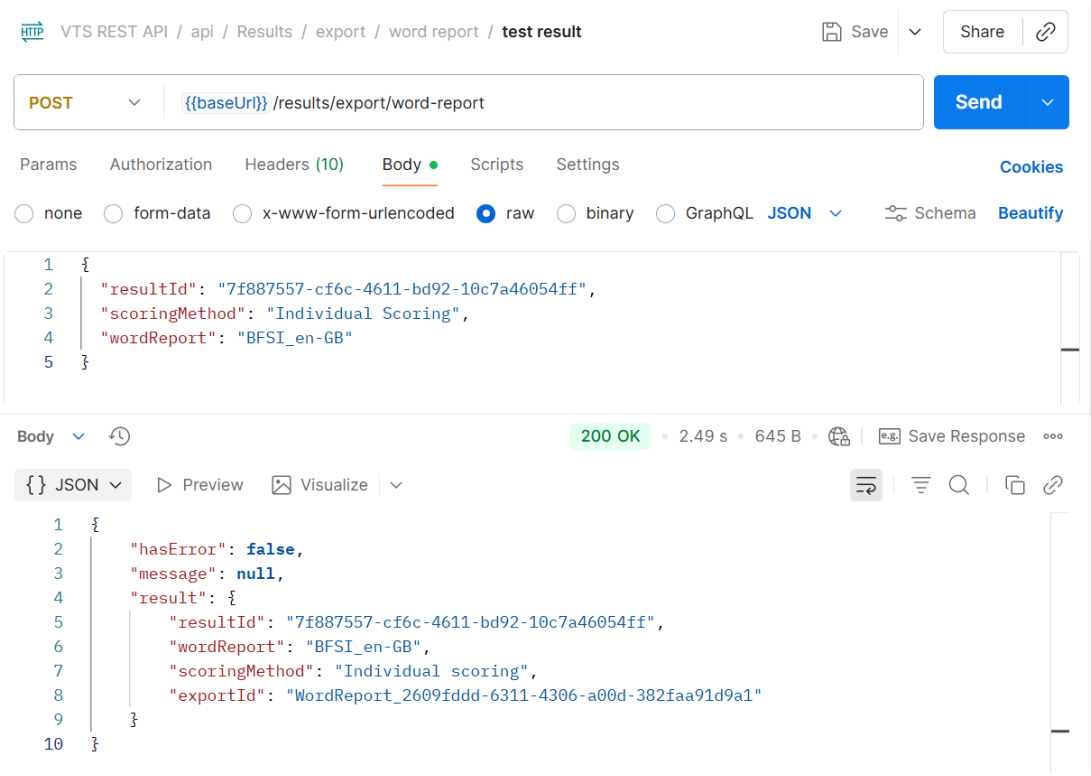
```
{
  "resultId": "7f887557-cf6c-4611-bd92-10c7a46054ff",
  "scoringMethod": "Individual Scoring",
  "wordReport": "BFSI_en-GB"
}
```

3.5.4.7.9.1.2 Request body test sequence

```
{
  "testSequenceId": "A136FE48-1CA6-41FB-9DD2-620D9D92B4B8",
  "scoringMethod": "Pilots",
  "wordReport": "Pilot report template"
}
```

3.5.4.7.9.1.3 Expected response

```
{
    "hasError": false,
    "message": null,
    "result": {
        "resultId": "7f887557-cf6c-4611-bd92-10c7a46054ff",
        "wordReport": "BFSI_en-GB",
        "scoringMethod": "Individual scoring",
        "exportId": "WordReport_2609fddd-6311-4306-a00d-382faa91d9a1"
    }
}
```



3.5.4.7.9.2 Download the file

Make the second call to download the exported file as described in section **Export single result as PDF** (see: REST API plugin)

3.5.4.7.10 Delete test result

Make a `DELETE` call to `{{baseUrl}}/Results/{{result id}}` where the result id is id of a single test result obtained from the response of the call `/Persons/{{external id}}/results`

If the last test of the sequence is deleted, the whole sequence is automatically deleted.

3.5.4.7.11 Delete test sequence

Make a `DELETE` call to `{{baseUrl}}/TestSequence/{{sequence id}}` where the `sequence` id is id of the whole test sequence obtained from the response of the call `/Persons/{{external id}}/results`

3.5.4.8 Logging

The **VIS** and **REST API plugin** generate log data that can be used to analyze their functionality. This data is recorded in the following log file:

```
C:\ProgramData\Schuhfried\Logs\VTS.Integration.Service.log
```

Please note: The directory “C:\ProgramData” is hidden by default. You can either make hidden items visible in your Windows Explorer or simply paste the path to the file into its address bar.

3.5.5 GDT plugin

The **GDT (Geräte-Daten-Träger) plugin** provides a standardized interface for data exchange between the **Vienna Test System (VTS)** and external systems. It is available as plugin of the VTS Integration Service. It facilitates communication by exchanging `.GDT` files through a predefined directory, enabling seamless integration based on the GDT

format standard. This plugin is ideal for environments that interact with other medical or diagnostic systems, as it ensures reliable and well-structured data transfer.

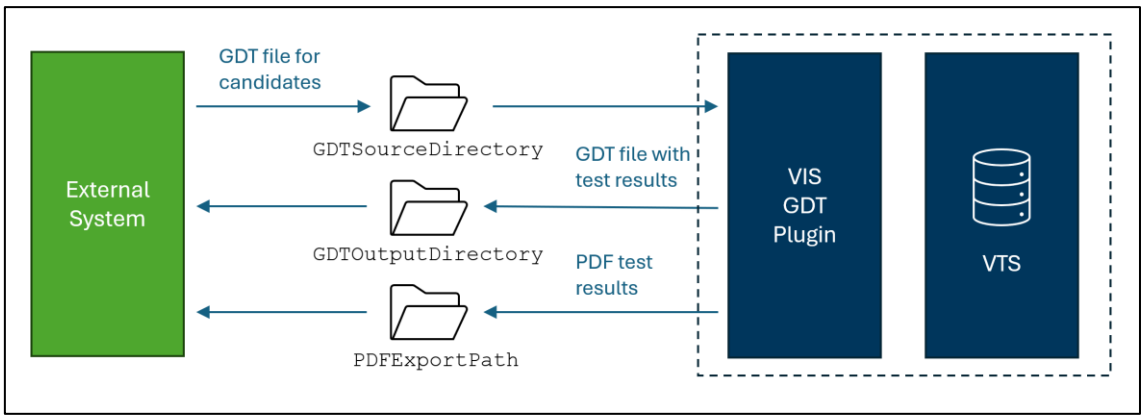
The GDT plugin implements the following so called “set types”, as defined in the **GDT standard, version 2.1** (see https://www.qms-standards.de/standards/gdt-schnittstelle/(website in German only)):

- **6302 – New Test Request** for importing new persons into VTS
- **6310 – Test Data Transfer** for export of test result data out of VTS

Please note that only certain fields from these data sets are supported. For a detailed list of the implemented fields, refer to the sections about the input and output files below.

3.5.5.1 Overview of functionality

The GDT plugin periodically checks the input folder for new files that contains persons for import. When a new file is detected, the plugin automatically imports the persons into VTS. After a person completes a testing and VTS generates a PDF with the test results, the GDT plugin processes this PDF and generates a corresponding GDT file with customizable test result variables. This GDT result file is saved in the output folder, where your external system can process it further. The following diagram outlines the flow of data and the relevant folders:



The PDF version of the test results is also saved in the PDF output folder, making it available for external processing if needed.

Note: Data exchange between VTS and GDT plugin happens over an internal file system folder. This folder should **not** be accessed or modified by your external system to avoid interfering with the internal workflow.

3.5.5.2 Setup and configuration

In order for the GDT interface to function, the GDT plugin must be configured in the settings file of the VIS and the VTS must be configured to automatically export test results after every completed testing. Here is a short step by step guide on how to configure a minimal working GDT setup. For advanced options please refer to the sections below.

3.5.5.2.1 1. Adapt the VIS settings file

The GDT plugin must be enabled and configured in the settings file (`appsettings.json`) of the VIS, by default located in `%PROGRAMFILES%\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`
Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

This file contains the configuration of all available VIS plugins. All settings relevant to the GDT plugin can be found under the section starting with “GDTPlugin”.

```
"GDTPlugin": {
  //...
}
```

3.5.5.2.1.1 1.1. Enable the GDT plugin

In order to enable the GDT plugin, change the value of the `Enabled` property to `true`.

```
"Enabled": "true",
```

3.5.5.2.1.2 1.2. Configure your directories

The configuration file contains default values for the file paths used by the GDT plugin (`GDTSourceDirectory`, `GDTOutputDirectory`, `PDFExportPath`, `StandardExportFolder`). While the default values can be used, it is usually recommended to change them to a location of your choice:

- `GDTSourceDirectory`, `GDTOutputDirectory`, `PDFExportPath` must also be accessible to the system that you want to connect to (e.g. your hospital information system).
- `StandardExportFolder` is only used by VTS, its value must also be configured in VTS (detailed instructions below).

Note: Since the configuration is in a JSON file, all backslashes (“\”) must be escaped (“\\”). The use of network drives is possible, but Windows filesystem restrictions require that the logon account of the *WTS Service* has access to the chosen location. By default, the *Local System Account* is configured, which usually does not have such access.

Example

Example directory configuration in the appsettings.json file, assuming "C:\My-GDT-Exchange" is a custom folder intended for GDT file exchange.

```
"GDTPlugin": {
    "Enabled": "true",
    // ...
    "GDTSourceDirectory" : "C:\\My-GDT-Exchange\\VTS-Source",
    "GDTOutputDirectory" : "C:\\My-GDT-Exchange\\VTS-Output",
    // ...
    "PDFExportPath": "C:\\My-GDT-Exchange\\VTS-PDF-Export",
    "StandardExportFolder":
"C:\\ProgramData\\SCHUHFRIED\\export\\_tempGDTExport",
    // ...
  },
```

3.5.5.2.1.3 1.3. Define export definition(s)

Although the GDT standard defines how data is exchanged, it doesn’t specify which results from VTS should be included. That’s why export definitions are needed — they determine which variables of the conducted tests, test sets, or test batteries will be exported. Only those listed in the `ExportDefinitions`section will be included in the export. If a test, test set or test battery is not listed there, its results will not be sent.

Export definitions must be tailored to each specific use case; they depend on the tests used, the goals of the testing, and the connected system. By default, an example export

definition is provided, but it only applies to the FEV test set. Therefore, in order to get a fully functional GDT connection, the required export definitions must be created in this step, usually together with psychological experts.

For a detailed description on how an export definition is defined, see Export definitions.

3.5.5.2.1.4 1.4. Apply changes

⚠ After saving changes to the settings file, you must restart the Windows service *WTS Service* to apply the updates and load the plugin with the new configuration. A description of how to restart the service can be found on the page: The VTS does not start from the troubleshooting section. If you are unsure how to restart a Windows service, you may also reboot your machine.

3.5.5.2.2 2. Configuration in the Vienna Test System administration software

Now that the GDT plugin is configured, the VTS must be configured accordingly, in order to enable generated test results to automatically trigger a GDT data exchange. The following settings must be configured in the *Settings* tab of the Vienna Test System administration software (old design in gray). Please note that those settings are currently only available in the old design of the Client, you may need to switch to it to access them. You can switch to the old design using the *New design* toggle button: 

.

3.5.5.2.2.1 2.1. Configuration of the default folder for data export

Go to *Settings → Data export / import → Default folder for data export* and use the folder selector to choose the directory where thr VTS will export test results to.

> This folder **must match** the path specified in the `StandardExportFolder` element of the GDT plugin configuration in the settings file.

Click the *Save* button to apply the changes.

3.5.5.2.2.2 2.2. Configuration of the automatic test result output

Navigate to *Settings → Test Results Output → Automation Options*, then enable the checkbox *Automatic test results output*.

In the *Automatic file name* dropdown, select the option *3 – Personal ID and unique test ID*.

Click *Save* to apply the changes.

3.5.5.2.2.3 2.3. Configuration of the automatic test result output for Direct testing

Required only if testing is done in Direct Testing mode.

Navigate to *Settings → Direct Testing→ Scoring*, then in the *Automatic test results output* dropdown, select the option *2 - Save the test results automatically as PDF file in the folder for data export*.

In the *Automatic file name* dropdown, select the option *3 – Personal ID and unique test ID.*

Click *Save* to apply the changes.

3.5.5.2.3 3. Test your setup

3.5.5.2.3.1 3.1. Import

Place an example GDT file into the configured `GDTSourceDirectory`. After a short time, it should be detected, processed and deleted by the VIS plugin. Verify that the person was created correctly.

See section Example input file for an example input file.

3.5.5.2.3.2 3.2. Export

Administer a test, test set or test battery for which an export definition is configured. After the testing is completed, a GDT output file should appear in the configured `GDTOutputDirectory`.

3.5.5.2.3.3 3.3. Troubleshooting

In all cases, you may check the log files for information about possible issues (see the Logging section).

- **Input files are not processed**
  - Make sure the configured directories are spelled exactly as required.
  - Ensure you have a valid license for the VIS service.
  - Ensure the *WTS Service* has been restarted and all settings are correctly applied.
- **Input files are processed but no persons get created (or not correctly)**
  - The input files could contain invalid or unsupported data.
  - Make sure input files are encoded in UTF-8.
  - Ensure that the Windows user running the *WTS Service* has sufficient rights to access the `GDTSourceDirectory`.
- **No output files are created**
  - Make sure the configured directories are spelled exactly as required.
  - Ensure that the StandardExportFolder in the VIS settings file matches the configuration in VTS.
  - Ensure there is a matching export definition for your tests.
  - Ensure that the Windows user running the *WTS Service* has sufficient rights to access the output directories.
  - Ensure the *WTS Service* has been restarted and all settings are correctly applied.
- **Unexpected GDT files are created for my finished tests / test battery**
  - When an export definition matches a test battery, it will overrule test definitions defined for single tests. On the other hand, if no export definition matches your test battery, export definitions for single tests apply. Make sure that the export definitions match your expectations.

3.5.5.3 Further information and reference

The following sections contain more detailed information about the various topics related to the GDT plugin and its functionality.

3.5.5.3.1 VIS settings file

The GDT plugin must be enabled and configured in the VIS settings file that is by default located in `%PROGRAMFILES%\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`
Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

This file contains the configuration of all available VIS plugins. All settings relevant to the GDT plugin can be found under the section starting with “GDTPlugin”.

3.5.5.3.1.1 Settings reference

Field	Description	Note
`Enabled`	Defines if the plugin is enabled and should be started.	**Must be set to** `true`
`GDTSourceDirectory`	Path to the folder from which the plugin will read the input GDT files containing personal data to import. Your system connected to VTS over the GDT interface must be configured to upload those files here.	**Must be modified to match your setup.** The use of network drives is possible, but Windows filesystem restrictions require that the logon account of the “WTS Service” has access to the chosen location. By default, the “Local System Account” is configured, which usually does not have such access.
`GDTOutputDirectory`	Path to the folder where the plugin outputs GDT files with test results. Your system connected to VTS over the GDT interface must be configured to import from here.	**Must be modified to match your setup.**
`StandardExportFolder`	Path to the folder where VTS outputs PDF files with results of finished tests.	**Must be modified to match your setup.**
`PDFExportPath`	Path to the folder where GDT plugin uploads results in PDF format referenced in the exported GDT file.	**Must be modified to match your setup if your receiving system must access results**

Field	Description	Note
		in pdf format in addition to GDT format.
`GDTSender`	Short name of the system communicating with VIS. Used in name of the GDT file with test result data like [GDTSender][GDTReceiver].gdt . Maximal length defined by the GDT interface is 4 characters.	Modify only if needed.
`GDTReceiver`	Identification of the system running VIS. Used to create name of the GDT file with test result data like [GDTSender][GDTReceiver].gdt Maximal length defined by the GDT interface is 4 characters.	Modify only if needed.
`TimeoutInSec`	Defines how often will plugin check for new incoming GDT files with persons for import and how often will prepare newly finished test results for the export. The value is specified in seconds.	Modify only if needed.
`PersonDefaultLanguage`	Default language used for the imported persons in case language is not provided in the GDT file with personal data to import.	Set only if person langue cannot be provided in the GDT file with personal data to import.
`PersonDefaultEducationLevel`	Default education level used for the imported persons in case education level is not provided in the GDT file with personal data to import.	Set only if education level of the persons cannot be provided in the GDT file with personal data to import.
`ExportRawScore`	Defines if raw scores are exported in addition to variables configured in the export definition.	Modify only if needed.
`StoreProcessedFailedFiles`	Defines if system stores files exported by VTS after processing. If set to `true` system will create subfolders `Processed` and `Failed` in the `StandardExportFolder` and stores processed PDF files there instead of deleting them. Otherwise will processed files be deleted.	Modify only if needed.
`ExportDefinitionGroup`	Definition of variables exported in the GDT file with test results. It is possible to create export definition for single tests as well as for a whole test battery or test battery with customized	**Must be modified to match used tests.**

Field	Description	Note
	scoring. More information about the export definition can be found in the section below.	

3.5.5.3.1.2 Export definitions

While the GDT standard clearly defines how data is exchanged, we still need to define which variables generated within VTS shall be exported. This is done via export definitions. To ensure export, every performed test, test set or test battery must have a corresponding export definition defined in the section `ExportDefinitions`. If a test or test set does not have an entry in the `ExportDefinitions`, **its results will not be exported**.

Each export definition must include a `Name` that matches the specific test, test set, or test battery it is intended for. It must also contain a list of `Variables` to be included in the export.

Each item in the `Variables` list should include the following fields:

- `TestName`: The test label of the test from which the variable is exported. The test label is the commonly used short form of the test name, it is explicitly stated on the title page of the corresponding test manual.
- `ShortCode`: A unique identifier for the variable used in the export. Available variables are described in the test manual or can easily be obtained by an example CSV export of a test result where each variable shows up as a column.
- `DisplayName`: Optional. A descriptive label for the variable that will appear in the exported data (can be freely chosen). If not provided, description of the variable as defined by SCHUHFRIED is used.

Multiple export definitions can be provided, but each test, test set, or test battery may have only one export definition.

If a test battery is performed and it does not have its own export definition, the system will attempt to export each individual test within the battery based on their own export definitions. This means that even without a battery-level configuration, results for tests inside the battery can still be exported, provided those individual tests are configured correctly in the `ExportDefinitions`.

3.5.5.3.1.3 Example

Export definition for the AVEM and BFSI tests, as well as for a custom test battery TB1 and the FEV test set.

```
{
      "ExportDefinitions": [
           {
          "Name": "FEV", //test set
          "Variables": [
            {
              "TestName": "RT",
              "ShortCode": "MRZ",
              "DisplayName": "Reaktionsfähigkeit"
            },
            {
              "TestName": "COG",
              "ShortCode": "MTRN",
              "DisplayName": "Konzentrationsleistung"
```

```
      },
      {
        "TestName": "LVT",
        "ShortCode": "S",
        "DisplayName": "Orientierungsleistung"
      },
      {
        "TestName": "DT",
        "ShortCode": "ZV",
        "DisplayName": "Belastbarkeit"
      },
      {
        "TestName": "ATAVT",
        "ShortCode": "UEB",
        "DisplayName": "Aufmerksamkeitsleistung"
      }
    ]
  },
  {
    "Name": "TB1", //custom testbattery TB1
    "Variables": [
      {
        "TestName": "BFSI",
        "ShortCode": "A",
        "DisplayName": "TB Veträglichkeit"
      },
      {
        "TestName": "AVEM",
        "ShortCode": "DISTANZ",
        "DisplayName": "TB Distanzierung"
      }
    ]
  },
  {
    "Name": "BFSI", //standard test
    "Variables": [
      {
        "TestName": "BFSI",
        "ShortCode": "A",
        "DisplayName": "Agreeableness"
      },
      {
        "TestName": "BFSI",
        "ShortCode": "C",
        "DisplayName": "Conscientiousness"
      },
      {
        "TestName": "BFSI",
        "ShortCode": "E",
        "DisplayName": "Extraversion"
      },
      {
        "TestName": "BFSI",
        "ShortCode": "N",
        "DisplayName": "Emotional stability"
      },
      {
        "TestName": "BFSI",
        "ShortCode": "O",
        "DisplayName": "Openness"
      }
    ]
  },
  {
    "Name": "AVEM", //standard test
    "Variables": [
```

```
            {
              "TestName": "AVEM",
              "ShortCode": "DISTANZ",
              "DisplayName": "Distancing ability"
            },
            {
              "TestName": "AVEM",
              "ShortCode": "EHRGEIZ",
              "DisplayName": "Work-related ambition"
            },
            {
              "TestName": "AVEM",
              "ShortCode": "ERFOLG",
              "DisplayName": "Experience of success at work"
            },
          ]
        }
      ]
    }
```

3.5.5.3.2 GDT input files

The GDT input files containing personal data for import must follow the structure defined for the GDT set type **6302 – New Test Request**. It must include all mandatory fields, and each line must be terminated with carriage return and line feed characters (CR LF).

To be processed, the input file must be placed in the preconfigured `GDTSourceDirectory`

> The input GDT file **must be encoded in UTF-8**. Using any other encoding may result in incorrect handling of names containing **special characters**, and proper data processing cannot be guaranteed.

3.5.5.3.2.1 File name

Name of the file must match format `[GDTReceiver][GDTSender][free text].gdt` with the values of `GDTReceiver` and `GDTSender` as defined in the VIS settings file, see: (8.29-en) (en-US) GDT plugin#vis_config.

The following example file name matches the default values in the configuration: **WTSBAD_max_mustermann.GDT:**

- “WTS” is the `GDTReceiver`
- “BAD” is the `GDTSender`
- “_max_mustermann” is just free text that is irrelevant for processing
- “.GDT” is the mandatory file extension

3.5.5.3.2.2 File structure

> The file structure must be exactly as defined in the GDT standard. The following description is only provided as contextual information. For details on the required file structure, see the GDT 2.1 standard.

The file consists of several lines in text format. Each line starts with 3 characters specifying the length of the line in total characters, including control characters. It is then followed by a 4 character field label and the content. Each line is terminated by a carriage return and line feed character.

Considering the example line “0133102John”, it consists of:

- “013”: the total length (3 for “013” itself + 4 for the field label “3102” + 4 for “John” + the 2 control characters *CR LF*)
- “3102”: the field label for Patient First Name
- “John”: the value

3.5.5.3.2.3 Supported field labels

Field label	GDT Description	Field in VTS	Note
8000	Sentence ID		**Mandatory** Must contain 6302
8100	Sentence Length		**Mandatory** The system does not validate the **Length** field in incoming messages, even though this value is typically required. The field should indicate the total length of the entire message or sentence in bytes. However, **VIS does not check this value and will not reject messages that contain an incorrect length.**
9218	Version GDT		**Mandatory** Must be 2.10
3000	Patient Number / Patient Label	Personal ID	**Mandatory** Numerical number between 1 and 2147483647 No leading zeros allowed.
3101	Name of Patient	Last name	**Mandatory**
3102	Patient First Name	First name	**Mandatory**
3103	Patient Birth Date	Date of birth	**Mandatory** Format DDMMYYYY
3110	Patient Sex	Gender	**Mandatory** Allowed values: • 1 - male • 2 - female
3628	First Language of Patient	Language	**Optional -** Value taken from the configuration if not provided. Language code in BCP 47 format. E.g. de-DE for German, en-US for English.
4221	Education level	Education level	**Optional -** Value taken from the configuration if not provided. Numerical value between 0 and 5. • ? - Education level unknown • 1 - Compulsory schooling not completed (less than 9 years of school) or special school

Field label	GDT Description	Field in VTS	Note
			• 2 - Completed compulsory schooling or an intermediate secondary school (9-10 years of school) • 3 - Completed vocational training (10-12 years of school) • 4 - High school graduation with university entrance exam (12-13 years of school) • 5 - University or college degree

3.5.5.3.2.4 Example input file

```
01380006302
0128100128
01392182.10
01330001234
0123101Doe
0133102John
017310302031988
01031101
0143628de-DE
01042213
```

Example file for download: WTSBAD_example_input_file.gdt

3.5.5.3.3 Output GDT file

The output GDT file containing test result data follows the structure of GDT set type **6310 - Test Data Transfer**

The output file is stored by the GDT plugin into predefined folder `GDTOutputDirectory`.

3.5.5.3.3.1 File name

Exported output GDT files have the following name structure `[GDTSender][GDTReceiver].[gdt/incremental number]` This means the extension will be .gdt for the first file, and a three digit number starting with 001 for all subsequent files, e.g. `BADWTS.GDT`, `BADWTS.001`, `BADWTS.002`.

3.5.5.3.3.2 Example output file

Example of an output GDT file containing test results for the BFSI test based on the example configuration

```
01380006310
0128100864
0138402BFSI
014921802.10
017300086220512
0153101Homola
0173102Vladimir
017310326042021
01031102
017620026052025
0156201143014
0356220Big-Five Struktur Inventar
0126303pdf
0136304BFSI
```

```
0506305C:\PDFexport\BADWTS_86220512_BFSI.pdf
0258410BFSI/S1 - A - PR
0228411Agreeableness
01084200
0108421%
0208410BFSI/S1 - A
0228411Agreeableness
0098420
0258410BFSI/S1 - C - PR
0268411Conscientiousness
01084200
0108421%
0208410BFSI/S1 - C
0268411Conscientiousness
0098420
0258410BFSI/S1 - E - PR
0218411Extraversion
01084200
0108421%
0208410BFSI/S1 - E
0218411Extraversion
0098420
0258410BFSI/S1 - N - PR
0288411Emotional stability
01084200
0108421%
0208410BFSI/S1 - N
0288411Emotional stability
0098420
0258410BFSI/S1 - O - PR
0178411Openness
01084200
0108421%
0208410BFSI/S1 - O
0178411Openness
0098420
```

3.5.5.3.4 Test result in PDF format

In addition to the GDT output file, the GDT plugin also generates a test result in PDF format. This PDF file is saved in the directory specified by the `PDFExportPath` setting and is referenced in the GDT file using field **6305 – Reference to the file**.

3.5.5.3.5 Logging

The **VIS** and **GDT plugin** generate log data that can be used to analyze their functionality. This data is recorded in the following log files:

```
C:\ProgramData\Schuhfried\Logs\VTS.Integration.Service.log
```

Please note: The directory “C:\ProgramData” is hidden by default. You can either make hidden items visible in your Windows Explorer or simply paste the path to the file into its address bar.

3.5.6 HL7 plugin

The **HL7 plugin** provides a standardized interface for data exchange between the Vienna Test System (VTS) and external systems. It is available as plugin of the VTS integration service (VIS). It facilitates the HL7 (Health Level Seven) standard for the electronic exchange of clinical and administrative data between healthcare systems. It enables seamless communication between various medical applications, ensuring interoperability and efficient data sharing.

The plugin implements a subset of the **HL7 version 2.5.1** standard, the following message types are supported:

- **ORM** – Order messages
  - Used for creation of new persons and assigning testing to that person
- **ORU** – Observation result messages
  - Used for output of test results in numerical format
- **MDM** – Medical document management messages
  - Used for output of test results in PDF format

VTS implements a **subset of segments** for each supported message type, tailored to the needs of our system. More information about the structure of messages can be found in the sections for each message within this documentation.

3.5.6.1 Overview of functionality

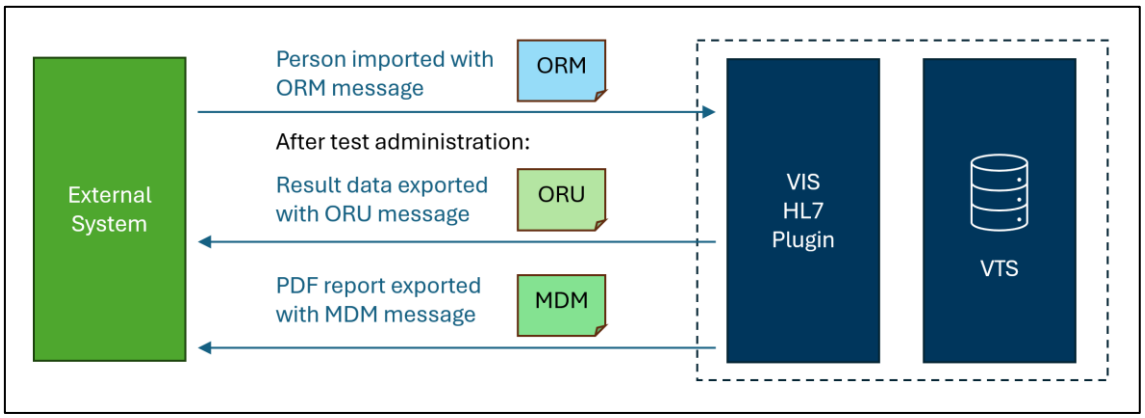
The HL7 plugin enables both the import of persons into the system as well as the automatic export of test results and reports after a completed testing. Persons are imported using **ORM messages** that allow the specification of personal data (e.g. first name, last name, date of birth) according to the HL7 standard. Once a person is successfully imported, testing can begin based on the customer's workflow — either through Direct Testing or by starting the test directly from the VTS administration software.

After a testing is completed, the HL7 plugin can trigger an automatic export back to the connected external system:

- **Test result values** are exported using **ORU messages**
- **A PDF document** containing test results or **PDF reports** generated from a Word-based report template are exported using **MDM messages**

The plugin supports exporting **both ORU and MDM messages**, or just one of them, depending on the preferred configuration.

Only persons that have been imported via HL7 trigger an automatic export via HL7. Test results for individuals who are manually created or already exist in the system prior to HL7 import will **not** be exported. The following diagram outlines the basic workflow when using VTS with the HL7 plugin:



The data exchange is possible via a file based interface or over TCP communication, which are here referred to as **file-based** and **TCP-based** mode. The core functionality of the HL7 plugin is identical in both **file-based** and **TCP-based** mode. The only

difference lies in the method of message transmission between the VTS and the connected system.

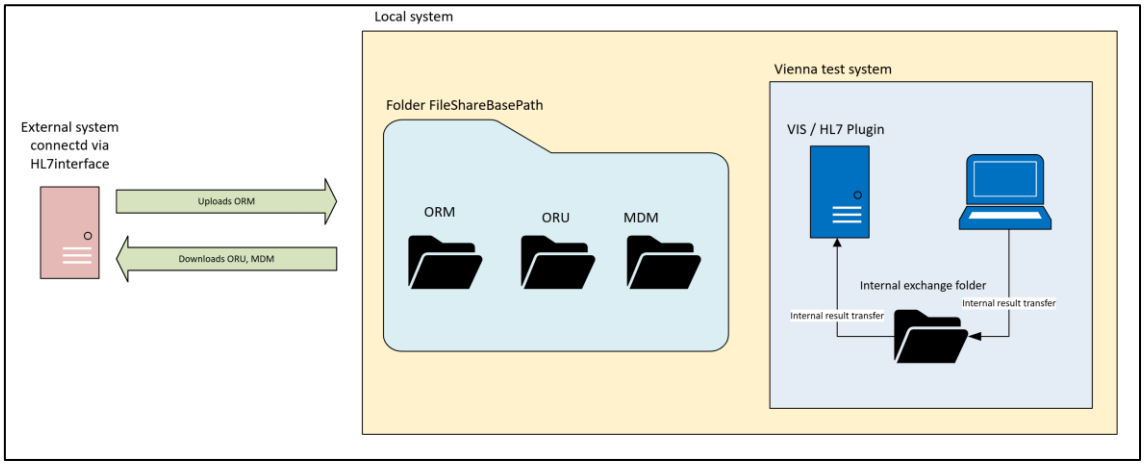
3.5.6.1.1 File-based mode

In **file-based mode**, the HL7 plugin monitors a folder for incoming **ORM messages**. When a new file is detected, the plugin processes the message and creates a new person record based on the data contained in the ORM message.

Once a testing is completed, the plugin performs the following actions:

- If configured**, generates an ORU message** containing the values of selected test variables.
    - The ORU message is saved into the “ORU” subfolder in the configured `FileShareBasePath`
- If configured**, generates an MDM message** that includes a **Base64-encoded PDF**
    - The ORU message is saved into the “MDM” subfolder in the configured `FileShareBasePath`

This workflow ensures that both structured data (via ORU) and document-based results (via MDM) are consistently exported and available for integration with external systems.



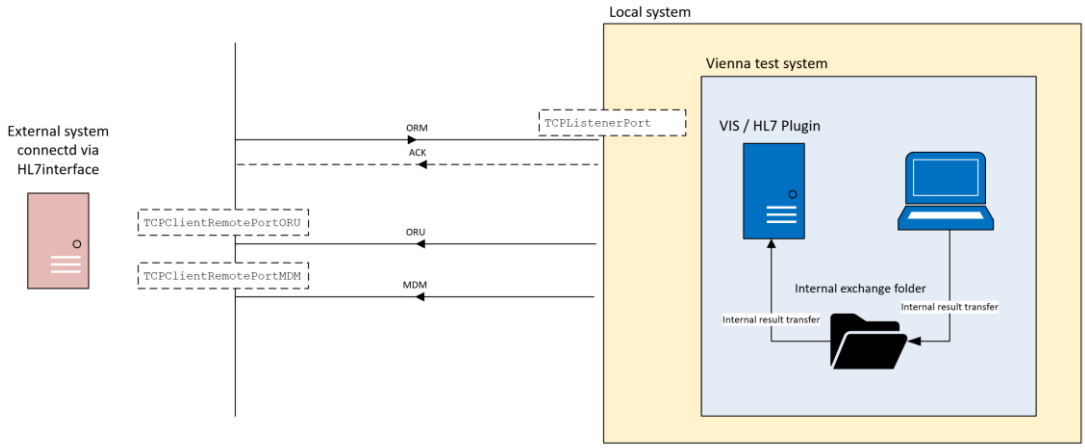
3.5.6.1.2 TCP-based mode

In TCP-based mode, the HL7 plugin listens on a predefined port for incoming **ORM messages**. Upon receiving and processing a message, the plugin will, depending on the configuration, either send an **ACK message** with a status response or proceed without acknowledgment. If the incoming ORM message meets all required criteria, a new person record is created and becomes available for testing.

Once a testing is completed, the plugin performs the following actions:

- If configured**, generates an ORU message** containing the values of selected test variables.
    - Sends the ORU message over TCP connection to predefined address and port
- If configured**, generates an MDM message** that includes a **Base64-encoded PDF**
    - Sends the MDM message over TCP connection to predefined address and port

This workflow ensures that both structured data (via ORU) and document-based results (via MDM) are consistently exported and available for integration with external systems.



3.5.6.2 Setup and configuration

For the HL7 interface to function correctly, the HL7 plugin must be configured in the VIS settings file. Additionally, configuration through the old design of the VTS is required to set up the CSV export profile for data transmitted via the ORU message, as well as to configure the PDF file sent with the MDM message. This PDF may either contain the result directly or a result generated from a Word-report template. Here is a short step by step guide on how to configure a minimal working HL7 setup using file-based mode. For advanced options please refer to the sections below.

3.5.6.2.1 1. Adapt the VIS settings file

The HL7 plugin must be enabled and configured in the settings file of the VIS, by default located in `%PROGRAMFILES%\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`
Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

This file contains the configuration of all available VIS plugins. All settings relevant to the HL7 plugin can be found under the section starting with “HL7Plugin”.

```
"HL7Plugin": {
  //...
}
```

3.5.6.2.1.1 1.1. Enable the HL7 plugin

In order to enable the HL7 plugin, change the value of the `Enabled` property to `true`.

```
"Enabled": "true",
```

3.5.6.2.1.2 1.2. Configure a file share path

The file-based data exchange facilitates a directory for exchanging the various messages. The path to this directory must be set via the `FileShareBasePath` setting. The directory specified must exist and be accessible both by the VIS as well as the external system that you want to connect to (e.g. your KIS).

Note: Since the configuration is in a JSON file, all backslashes ("\") must be escaped ("\\"). The use of network drives is possible, but Windows filesystem restrictions require that the logon account of the "WTS Service" has access to the chosen location. By default, the "Local System Account" is configured, which usually does not have such access.

Example

Example directory configuration in the appsettings.json, assuming "C:\My-HL7-Exchange" is a custom folder intended for HL7 file exchange

```
"HL7Plugin": {
    "Enabled": "false",
    // ...
    //File based settings
    "FileShareBasePath": "C:\\My-HL7-Exchange",
    // ...
  },
```

3.5.6.2.1.3 1.3. Apply changes

⚠ After saving changes to the settings file, you must restart the Windows service "WTS Service" for the system to apply the updates and load the plugin with the new configuration. If you are unsure how to restart a Windows service, you may also reboot your machine.

3.5.6.2.2 2. Configuration in the Vienna Test System Client

Now that the HL7 plugin is configured, the VTS must be configured accordingly. The following settings must be configured in the "Settings" tab of the Vienna Test System Client (old design). Please note that those settings are currently only available in the old design of the Client, you may need to switch to it to access them.

- Configuration of folder for internal data export
- Configuration of Person database, so that it contains necessary fields
- If ORU message is desired, configuration of variables transmitted in the ORU message
- If MDM message is desired, configuration of type of file transmitted in the MDM message

3.5.6.2.2.1 2.1. Configuration of folder for internal data export

Go to **Settings** → **Data export / import** → **Default Folder for data export** and use the folder selector to choose the directory where the VTS will export the test results.

This folder serves as the internal exchange location for transferring data between the VTS and the HL7 plugin and can be set to any directory of your choosing.

3.5.6.2.2.2 2.2. Configuration of Person database

1. Navigate to **Settings** → **Person Management** → **Person database** and click on the **Define** button.
2. In the opened **"Define person database"** window, ensure that the following fields are selected in the right-hand panel of the selector:
    - **Personal ID**
    - **Test battery for Direct Testing**
    - **Comments**

3. If any of these fields are not already selected, add them from the list of available fields on the left-hand side.
    - Additional fields may also be selected. While they do not interfere with the functionality of the HL7 plugin, they will not be included in the exported data.
4. Click **OK** to save the changes.

3.5.6.2.2.3 2.3. Configuration for the ORU message

The **ORU message** includes values of test variables that can be freely defined. To configure which variables should be exported, follow these steps:

1. Navigate to **Settings** → **Data export / import**.
2. Click **"Open Management"** under **"Manage export settings"**.
3. In the **"Export Definitions of Results"** window, click **"New"** to create a new export definition.
    - You may assign any name to the new export definition.
4. Select the newly created export definition from the list and configure it as follows:
    - **Delete** all default entries related to personal data export:
        - Person's Name
        - Date of birth
        - Test duration in minutes
        - Education level
        - Gender
    - From the **"Person database fields"** panel, **add the "Comment" field** and ensure it remains the **first entry** in the table.
    - Enable the checkbox **"Export testing date"**.
5. After configuring the mandatory fields, select any additional test variables you wish to export from the **"Selection"** panel on the right side of the window.
6. Once your selection is complete, click **"Save"** to save the export profile and close the window.
7. Navigate to **Settings** → **Direct Testing** → **Scoring**.
    - In the **"Automatic data export"** dropdown, select the name of the export profile you created in steps 3–6 above.
    - Click **Save** to apply the changes.
8. Navigate to **Settings** → **Test Results Output** → **Additional Options**.
    - In the **"Automatic data export after test presentation"** dropdown, select the name of the export profile you created in steps 3–6 above.
    - Click the **Save** button to apply the changes.

3.5.6.2.2.4 2.4 Configuration for the MDM message

The **MDM message** can be used to export one of the following PDF files, **but not both** at the same time"

- A **PDF containing the test result**, or
- A **PDF generated from a Word report template**.

The required configuration depends on which export format you intend to use.

1. Navigate to **Settings** → **Direct Testing** → **Scoring**.
2. In the **"Automatic file name"** dropdown, select: `3 - Personal ID and unique test ID`
3. In the **"Preferred scoring method"** dropdown, select the scoring method to be used.
4. To export test results as PDF files:
    - In the **"Automatic test results output"** dropdown, select: `2 - Save the test results automatically as PDF file in the folder for data export`
    - *If you do not wish to export results as PDF, skip this step.*
5. To export a PDF generated from a Word report template:
    - In the **"Automatic report generation"** dropdown, select: `2 - Save the report automatically as PDF file in the folder for data export`
    - In the **"Default report template"** dropdown, select the desired Word report template.
    - *If you do not wish to export results as PDF, skip this step.*
6. Click **Save** to apply the changes.
7. Navigate to **Settings** → **Test Results Output** → **Automation Options**.
8. In the **"Automatic file name"** dropdown, select: `3 - Personal ID and unique test ID`
9. To export test results as PDF files:
    - Check the box for **"Automatic test results output"**.
    - *If you do not wish to export results as PDF, skip this step.*
10. To export a PDF generated from a Word report template:
    - Check the box for **"Automatic report generation"**.
    - In the **"Default report template"** dropdown, select the desired Word report template.
    - *If you do not wish to export results as PDF, skip this step.*
11. Click **Save** to confirm and apply the settings.

3.5.6.2.3 3. Test your setup

3.5.6.2.3.1 3.1. Import

Place an example HL7 ORM file into the configured `FileShareBasePath` in the “ORM” subdirectory. After a short time, it should be detected, processed and deleted by the VIS plugin. Verify that the person was correctly created.

See (8.29-en) (en-US) HL7 plugin for an example input file.

3.5.6.2.3.2 3.2. Export

Administer a test, test set or test battery for which an export definition is configured. After the testing is completed, an ORM and MDM output file should appear in the configured `FileShareBasePath` in the respective subdirectories.

3.5.6.2.3.3 3.3. Troubleshooting

In all cases, you may check the log files for information about possible issues (see (8.29-en) (en-US) HL7 plugin)

- **Input files are not processed**
  - Make sure the configured directories are spelled exactly as required
  - Ensure you have a valid VTS license for the VIS service
  - Ensure the “WTS Service” has been restarted and all settings are correctly applied
- **Input files are processed but no persons get created (or not correctly)**
  - The input files could contain invalid or unsupported data
  - Make sure input files are encoded in UTF-8
- **In case of TCP-based mode: No connection can be made to the service or no outputs are delivered**
  - Make sure all configured ports are reachable and accessible through the firewall
  - The configured ports must not be occupied by other services
- **No output files are created**
  - Revisit the ORU and MDM settings in the VTS client
  - Ensure the “WTS Service” has been restarted and all settings are correctly applied

3.5.6.3 Further information and reference

The following sections contain more detailed information about the various topics related to the HL7 plugin and its functionality.

3.5.6.3.1 VIS settings file

The HL7 plugin must be enabled and configured in the settings file of the VIS, by default located in `%PROGRAMFILES%\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`
Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

This file contains the configuration of all available VIS plugins. All settings relevant to the HL7 plugin can be found under the section starting with “HL7Plugin”.

3.5.6.3.1.1 Settings reference

Field	Description	Note
`HL7Plugin.Enabled`	Defines if the plugin is enabled and should be started.	**Must be set to** `true`
`HL7Plugin.ReceivingApplication`	Value used for MSH-5 Receiving application	Modify only if needed.
`HL7Plugin.ReceivingFacility`	Value used for MSH-6 Receiving facility	Modify only if needed.

Field	Description	Note
`HL7Plugin.SendingApplication`	Value used for MSH-3 Sending application	Modify only if needed.
`HL7Plugin.SendingFacility`	Value used for MSH-4 Sending facility	Modify only if needed.
`HL7Plugin.Mode`	Configuration if File-based or TCP-based mode is used.	**Must be configured.** Allowed values: • `FILE` - for File-based mode • `TCP` - for TCP-based mode
`HL7Plugin.FileShareBasePath`	Specifies the path to the folder used for exchanging files containing HL7 messages. Dedicated subfolders for ORM, ORU, and MDM messages will be automatically created within this directory. The plugin will read from and write to these subfolders as part of its operation.	**Must be configured if File-based mode is used.**
`HL7Plugin.TCPClientRemoteHost`	Specifies the IP address or hostname of the system connected through the HL7 interface. This value is required for establishing communication between systems.	**Must be configured if TCP-based mode is used.**
`HL7Plugin.TCPClientRemotePortORU`	Specifies the port on the system connected via the HL7 interface to which the HL7 plugin sends ORU messages over a TCP connection.	**Must be configured if TCP-based mode is used.**

Field	Description	Note
`HL7Plugin.TCPClientRemotePortMDM`	Specifies the port on the system connected via the HL7 interface to which the HL7 plugin sends MDM messages over a TCP connection.	**Must be configured if TCP-based mode is used.**
`HL7Plugin.TCPListenerPort`	Specifies the port on the local system running VIS where the HL7 plugin listens for incoming ORM messages transmitted over a TCP connection.	**Must be configured if TCP-based mode is used.**
`HL7Plugin.TCPSendTimeout`	Specifies the timeout value, in milliseconds, for sending messages to the host. If the HL7 plugin is unable to complete the transmission within this time, the send operation will be cancelled.	Modify only if needed.
`HL7Plugin.SendAck`	Determines whether the HL7 plugin sends an ACK (acknowledgment) message after receiving and processing an incoming ORM message. The ACK message includes information indicating whether the processing was successful and is sent over the same TCP connection.	Modify only if needed. Allowed values: • `true`- ACK message will be send • `false`- ACK message will not be send
`HL7Plugin.TXA2DocumentType`	Specifies the value assigned to the TXA-2 (Document Type) field within the MDM message. This value can be any string up to a maximum length of 30 characters."	Modify only if needed.

Field	Description	Note
HL7Plugin.TXA17DocumentCompletitionStatus	Specifies the value assigned to the TXA-17 (Document Completion Status) field within the MDM message. The value indicates the completion status of the document and therefore should conform to HL7-defined codes.	Modify only if needed.
HL7Plugin.TXA17DocumentCompletitionStatus	Specifies the value assigned to the OBX-3 (Observation identifier) used in the MDM message.	Modify only if needed.
AppSettings.Service.MandantName	Specifies multi-client (e.g. V12345_001) where plugin imports persons.	**Must be configured.**
AppSettings.Service.Language	Language used for the imported persons.	**Must be configured.** Language code in BCP 47 format. E.g. de-DE for German, en-US for English.

3.5.6.3.1.2 Example

Example of the section with the initial configuration of the HL7 plugin in the appsettings.json

```
  "HL7Plugin": {
    "Enabled": "false",
    "ReceivingApplication": "KIS",
    "ReceivingFacility": "ORBIS",
    "SendingApplication": "WTS",
    "SendingFacility": "WTS",
    //Possible Values: TCP, FILE
    "Mode": "FILE",
    //File based settings
    "FileShareBasePath": "C:\\HL7FileShare",
    //TCP settings
    //Host can be Hostname or IPAddress
    "TCPClientRemoteHost": "192.168.1.1",
    "TCPClientRemotePortORU": "11001",
    "TCPClientRemotePortMDM": "11001",
    "TCPListenerPort": "11000",
    //Timeout for sending Messages to TCPClientRemote-Address in ms
    "TCPSendTimeout": "10000",
    //Determine if ACK messages should be send on every incoming tcp
message
    "SendAck": "true"
  },
```

```
"AppSettings": {
  "Service.MandantName": "IncLic_001",
  "Service.Language": "de-DE",
  "LicenseServer": "https://localhost:7014",
  "PortalApiAddress": "https://localhost:7014"
},
```

3.5.6.3.2 Input ORM message

The input ORM message with personal data to import should contain following segments: MSH, PID, PV1, ORC, OBR, OBX. The message consists of several segments, each segment must start with the field identifier and be terminated using the **Carriage Return (CR)** character (`0x0D`).

> The input message **must be encoded in UTF-8**. Using any other encoding may result in incorrect handling of names containing **special or national characters**, and proper data processing cannot be guaranteed.

In file-mode, the input files must have the extension `*.hl7`. Otherwise, they will not be processed.

3.5.6.3.2.1 Supported ORM fields

Field in ORM message	Filed in VTS	Note
MSH-6		Multi-client. Used to identify mandant where person is imported
MSH-9		Message type. Must contain `ORM` at the fist first component e.g. `ORM^any_text`
PID-5.1	Last name	
PID-5.2	First name	
PID-7	Date of birth	In format YYYYMMDD
PID-8	Gender	M for Male. F for Female.
PV1 – Patient Visit segment		Segment PV1 must be present in the message. No data are loaded from the segment.
ORC-2.1	Personal ID	Numerical number between 1 and 2147483647 No leading zeros allowed.
OBR-4.1	Test battery for Direct Testing	
OBX-2		Supported values `MN` and `ED`
OBX-5	Education level	**Optional** Numerical value between 0 and 5. • ? - Education level unknown

Field in ORM message	Filed in VTS	Note
		• 1 - Compulsory schooling not completed (less than 9 years of school) or special school • 2 - Completed compulsory schooling or an intermediate secondary school (9-10 years of school) • 3 - Completed vocational training (10-12 years of school) • 4 - High school graduation with university entrance exam (12-13 years of school) • 5 - University or college degree Education level will be set to "? - Education level unknown" if not provided.

3.5.6.3.2.2 Example of the minimal ORM message

```
MSH|^~\&||||IncLic_001|||ORM^any_text|||||||
PID|||||Mustermann^Max||19900418|M|||
PV1|||||||||||||||||||||||||||||||||||||||||||
ORC||123456|||||||||||||||||
OBR||||NameOfTestBattery|||||||||||||||||||||||||||||||||||||||
OBX||ED|||1||||||
```

Example file for download: ORM_file.hl7

3.5.6.3.3 Acknowledgment message ACK

When configured, the **HL7 plugin** returns an **ACK (Acknowledgment) message** upon successful receipt and processing of an **ORM message**.

The `MSA-1` segment of the ACK message will contain:

- `'AA'` (Application Accept) if the message was successfully processed.
- `'AR'` (Application Reject) if the message was not successfully processed.

```
MSH|^~\&|WTS|WTS|KIS|ORBIS|20250617091651||ACK^O01^ACK|638857486118860565|
P|2.5|||NE|NE|NE
MSA|AA|MSGWTS202100000001
```

3.5.6.3.4 Output ORU message

ORU message contains following segments: MSH, PID, PV1, ORC, OBR and OBX for each exported variable.

Structure of **MSH** segment:

```
MSH-2  Fixed value: ^~\&
MSH-3  Value of SendingApplication from config file
MSH-4  Value of SendingFacility from config file
MSH-5  Value of ReceivingApplication from config file
MSH-6  Value of ReceivingFacility from config file
MSH-7  Date time of the message. Format YYYYMMDDHHMMSS
MSH-9  ORU^R01
MSH-10 Unique message ID
```

```
MSH-11 P
MSH-12 2.5
MSH-15 NE
MSH-16 NE
MSH-17 NE
```

The **PID, PV1, and ORC** segments are **exact copies** of the corresponding segments from the incoming ORM message, containing the personal data of the imported person.

The **OBR** segment contains name of the taken test battery for direct testing on position **OBR-4** and date of the test presentation on position **OBR-6**.

For each exported variable is one **OBX** segment created. OBX segments have the following structure:

```
OBX-1  Sequential increasing ID
OBX-2  NM - Numeric
OBX-3  Name of the exported variable
OBX-5  Value of the variable
OBX-11 F - Fianal result
OBX-14 - Date time of the observation in format YYYYMMDD
```

3.5.6.3.4.1 Example of the ORU message

```
MSH|^~\&|WTS|WTS|KIS|ORBIS|20250529121752||ORU^R01|638841178723625157|P|2.
5|||NE|NE|NE
PID|||||Mustermann^Max||19900418|M|||
PV1||||||||||||||||||||||||||||||||||||||||||||
ORC||123456|||||||||||||||||
OBR||||NameOfTestBattery||20250529||||||||||||||||||||||||||||||||||||
OBX|0|NM|PRIO/S1 RawScore - A - Raw score Artistic interests
(A)||893||||||F|||20250529|||
OBX|1|NM|PRIO/S1 RawScore - C - Raw score Conventional interests
(C)||908||||||F|||20250529|||
```

3.5.6.3.5 Output MDM message

MDM message contains following segments: MSH, EVN, PID, PV1, TXA and OBX containing exported pdf with base 64 encoding.

Structure of **MSH** segment:

```
MSH-2  Fixed value: ^~\&
MSH-3  Value of SendingApplication from config file
MSH-4  Value of SendingFacility from config file
MSH-5  Value of ReceivingApplication from config file
MSH-6  Value of ReceivingFacility from config file
MSH-7  Date time of the message. Format YYYYMMDDHHMMSS
MSH-9  ORU^R01
MSH-10 Unique message ID
MSH-11 P
MSH-12 2.5
MSH-15 NE
MSH-16 NE
MSH-17 NE
```

Structure of **EVN** segment:

```
EVN-1 Fixed value T02
```

```
EVN-2 Date time of the message. Format YYYYMMDDHHMM
EVN-3 Date time of the message. Format YYYYMMDDHHMM
```

The **PID** and **PV1** segments are **exact copies** of the corresponding segments from the incoming ORM message, containing the personal data of the imported person.

Structure of **TXA** segment:

```
TXA-1  Fixed value 1
TXA-2  Value of TXA2DocumentType from config file
TXA-3  Fixed value application/pdf
TXA-8  Date time of the message. Format YYYYMMDDHHMM
TXA-12 Name of the exported pdf file with ^WTS suffix
TXA-16 Name of the exported pdf file
TXA-17 Value of TXA17DocumentCompletitionStatus from config file
```

Structure of **OBX** segment:

```
OBX-1  Fixed value 1
OBX-2  Fixed value ED
OBX-5  PDF in base 64 encoding with fixed format
WTS^application^pdf^Base64^[PdfFileInBase64Encoding]
OBX-11 Fixed value F
OBX-14 Date time of the obesrvation in format YYYYMMDDHHMMSS
```

3.5.6.3.5.1 Example of the MDM message

```
MSH|^~\&|WTx|WT2x|KIx|ORBIx|20250529122932||MDM^T02^MDM_T02|63884118572857
6710|P|2.5|||NE|NE|NE
EVN|T02|202505291229|202505291229
PID|||||Mustermann^Max||19900418|M|||
PV1||||||||||||||||||||||||||||||||||||||||||||||||||
TXA|1|Report|application/pdf|||||202505291229||||21000008_7ad50946-ecd4-
4e04-8d3c-96bac437cc34.pdf^WTS||||21000008_7ad50946-ecd4-4e04-8d3c-
96bac437cc34.pdf|AU
OBX|1|ED|||WTS^application^pdf^Base64^[PdfFileInBase64Encoding]||||||F|||2
0250529121738|||
```

3.5.6.3.5.2 Line separators

In the generated files, each line is terminated using the **Carriage Return (CR)** character (`0x0D`).

When messages are transmitted over TCP using the **Minimal Lower Layer Protocol (MLLP)**:

- A **Vertical Tab (VT)** character (`0x0B`) is added at the **beginning** of the message.
- A combination of **File Separator (FS)** and **Carriage Return (CR)** characters (`0x1C 0x0D`) is appended at the **end** of the message

3.5.6.3.6 Logging

The **VIS** and **HL7 plugin** generate log data that can be used to analyze their functionality. This data is recorded in the following log files:

```
C:\ProgramData\Schuhfried\Logs\VTS.Integration.Service.log
```

Please note: The directory “C:\ProgramData” is hidden by default. You can either make hidden items visible in your Windows Explorer or simply paste the path to the file into its address bar.

3.5.6.3.7 Limitations

Test results can only be transmitted for persons who were imported into the system via the HL7 interface. Results for persons who were created manually or who already existed in the system prior to HL7 import will **not** be exported.

3.5.7 Universal plugin

The **Universal plugin** provides a standardized interface to the **Vienna Test System (VTS)**, enabling:

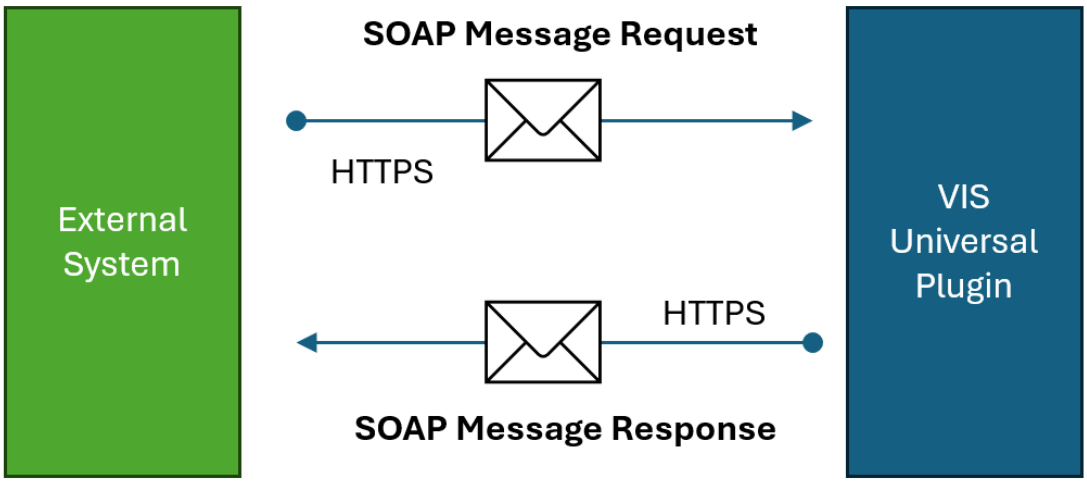
- **Person management** (creation, updating, searching and sending invitations for an online test)
- **Export of test results** in **PDF**, **CSV** and **SPSS** formats
- Various other operations such as the retrieval of test status or triggering an archiving operation

Communication is handled via a **SOAP 1.2 Web Service**, ensuring compatibility with open standards and integration flexibility.

3.5.7.1 Overview of functionality

SOAP (Simple Object Access Protocol) is a standard for sending messages between systems and applications. It offers a reliable way to exchange information. The Universal plugin includes a SOAP web service that supports different message types, allowing external systems to control the VTS or get data from it. Although SOAP supports various transport methods, the Universal plugin uses only HTTPS for communication.

The Universal plugin web service is passive, meaning it only reacts to incoming messages. It does not initiate any communication on its own and relies entirely on external systems to send requests or commands.



3.5.7.1.1 Authentication

The Universal plugin requires WS-Security authentication using a **UsernameToken over HTTPS**. All SOAP requests must be sent over a secure HTTPS connection, and the WS-Security header must include a `UsernameToken` containing the valid username and password. No client certificates are required. When testing with tools like SoapUI, ensure that WS-Security is enabled with `UsernameToken`, and set the password type to

either plain text (`PasswordText`), as required by your environment. Username and password for authentication are configured in the plugin config file, see also Universal plugin .

3.5.7.2 Setup and configuration

In order for the SOAP web service to be available, the **Universal plugin** must be configured in the **VIS settings file**. By default, the plugin listens to **port 9010**. If this port is unavailable or already in use by another application, it can be easily changed within the configuration file.

Here is a short step by step guide on how to configure a minimal working setup. For advanced options please refer to the sections below.

3.5.7.2.1 1. Adapt the VIS settings file

The Universal plugin must be enabled and configured in the VIS settings file by default located in `C:\Program Files\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`
Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

This file contains the configuration of all available VIS plugins. All settings relevant to the Universal plugin can be found under the section starting with “UniversalPlugin”.

```
"UniversalPlugin": {
  //...
}
```

3.5.7.2.1.1 1.1. Enable the Universal plugin

In order to use the Universal plugin, ensure the value of the `Enabled` property is set to `true` (it is enabled by default).

```
"Enabled": "true",
```

3.5.7.2.1.2 1.2. (Optional) Configure a custom port

If a port different to the standard one shall be used to listen to incoming requests, it needs to be changed in a setting named “Urls”, outside of the section “UniversalPlugin”.

```
"Urls": "https://localhost:9010",
```

3.5.7.2.1.3 1.3. Apply changes

⚠ After saving changes to the settings file, you must restart the Windows service “WTS Service” for the system to apply the updates and load the plugin with the new configuration. If you are unsure how to restart a Windows service, you may also reboot your machine.

3.5.7.2.2 2. Test your setup

3.5.7.2.2.1 2.1. Verify service operation

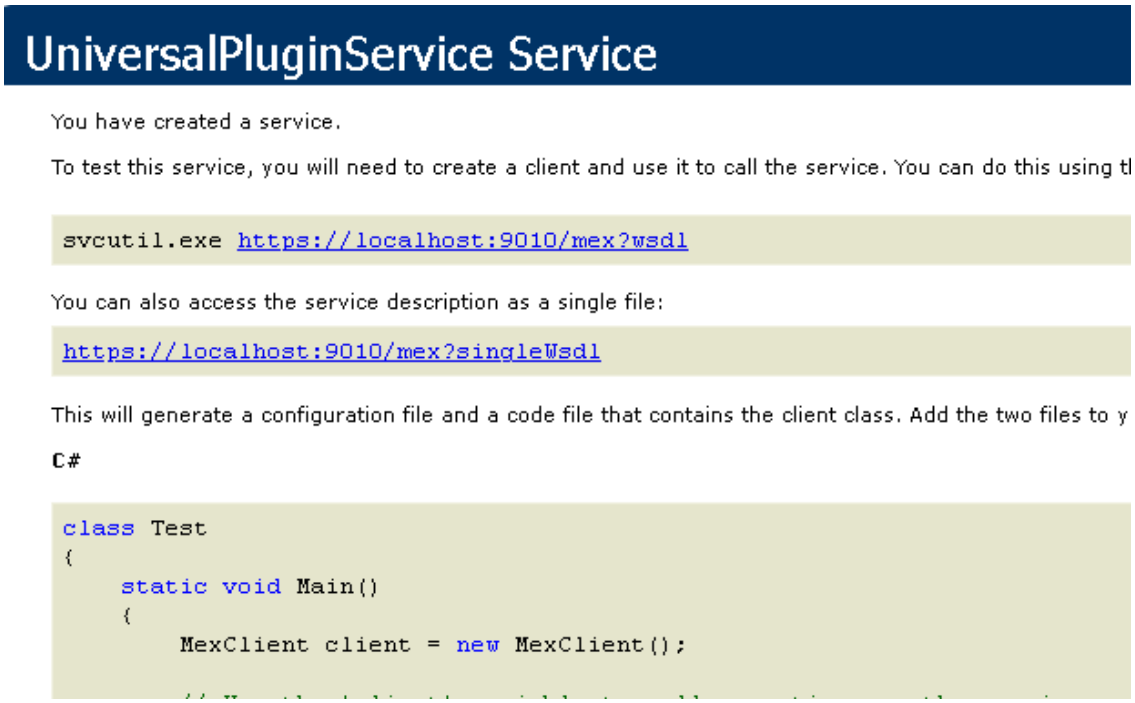
To confirm that the Universal plugin is running correctly, open a web browser and navigate to the plugin’s **Metadata Exchange (MEX) endpoint**:

```
https://[machineName]:[port]/mex
```

For example, if running locally on the default port:

```
https://localhost:9010/mex
```

This endpoint provides metadata about the service and should be accessible if the plugin is properly configured and operational. The following screenshot shows how it should look like in the web browser:



Please note that the “singleWsdl” endpoint does not work due to legacy reasons (namespace collisions that cannot be resolved in order to maintain compatibility).

3.5.7.2.2.2 2.2. Samples

A sample project can be downloaded from the following link: https://dev.azure.com/SchuhfriedGmbh/SchuhfriedPublic/_git/VisSamples.

Consider reading the project’s README.md before running it.

3.5.7.2.2.3 2.3. Troubleshooting

In all cases, you may check the log files for any hints about what could be wrong (see: Universal plugin)

- **The MEX service endpoint cannot be reached in browser**
  - A firewall may block incoming connections to the configured port. Ensure that incoming connections on the specified port are accepted.
  - Verify that the configured port matches the port used in the URL
  - Ensure the “WTS Service” has been restarted and all settings are correctly applied
- **Messages are terminated with 401 or 403 HTTP status codes**
  - Ensure that messages are properly authenticated (see above)
- **Messages are terminated with error status codes**
  - Ensure that there are no inconsistencies in your data, e.g. malformed fields or a reference to a non-existing test battery.

- Check the logs for information about possible issues.

3.5.7.3 Further information and reference

The following sections contain more detailed information about the various topics related to the Universal plugin and its functionality.

3.5.7.3.1 VIS settings file

The Universal plugin must be enabled and configured in the settings file of the VIS by default located in `C:\Program Files\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`
Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

This file contains the configuration of all available VIS plugins. All settings relevant to the Universal plugin can be found under the section starting with “UniversalPlugin”.

3.5.7.3.1.1 Settings reference

Field	Description	Note
`Urls`	URL and port under which is plugin running	Modify only if needed.
`UniversalPlugin.Enabled`	Defines if the plugin is enabled and should be started.	**Must be set to** `true`
`UniversalPlugin.DefaultTestBattery`	Default test battery for direct testing used for the imported persons in case test battery is not provided in the call to create new person.	Modify only if needed.
`UniversalPlugin.CertificateSearchKind`	Type of identification of the certificate in the communication with the plugin.	Modify only if needed.
`UniversalPlugin.CertificateSearchValue`	Identification of the certificate used in the communication with the plugin.	Modify only if needed.
`UniversalPlugin.UsernameToVisService`	The expected username that clients must provide in the WS-Security `UsernameToken` when sending SOAP requests. This acts as the primary identity used to validate the sender.	**Must be configured.**
`UniversalPlugin.PasswordToVisService`	The password associated with the specified username. This value must match the password included in the WS-Security `UsernameToken` received in the SOAP message. Depending on	**Must be configured.**

Field	Description	Note
	the client's configuration, the password may be sent in plain text or as a password digest.	
`AppSettings.Service.MandantName`	Specifies multi-client (e.g. V12345_001) where plugin performs actions.	**Must be configured.**
`AppSettings.Service.Language`	Language used for the imported persons.	**Must be configured.** Language code in BCP 47 format. E.g. de-DE for German, en-US for English.

3.5.7.3.1.2 Example

Example of the section with the initial configuration of the Universal plugin in the appsettings.json

```
"Urls": "https://localhost:9010",
"UniversalPlugin": {
  "Enabled": "true",
  "DefaultTestBattery": "",
  "CertificateSearchKind": "FindBySubjectName",
  "CertificateSearchValue": "SchuhfriedSelfSignedCertificate",
  "UsernameToVisService": "customUsername",
  "PasswordToVisService": "customPassword"
},
```

3.5.7.3.2 Interface description

A complete description of the interface is available in the **WSDL file** available via the interface's **Metadata Exchange (MEX) endpoint** (`https://[machineName]:[port]/mex`).

Below is a summary of the available endpoints:

3.5.7.3.2.1 Endpoints

Name	URL
IUniversalPluginService	`https://[machineName]:[port]/Universal`
IUniversalPluginServiceStreamed	`https://[machineName]:[port]/UniversalServiceStreamed`
IUniversalPluginSpecialCaseService	`https://[machineName]:[port]/UniversalSpecialCase`
IMex	`https://[machineName]:[port]/mex`

3.5.7.3.2.2 IMex interface

Operation name	Description
Ping	Ping endpoint to verify functionality of the plugin. Can be called without authentication.

3.5.7.3.2.3 IUniversalPluginService operations

Operation name	Description
GetCandidate	Returns data for a single person.
GetAllCandidates	Returns data for all persons in the database.
AddCandidate	Creates new person in the VTS database.
UpdateCandidate	Updates existing person.
DeleteCandidate	Deletes one person.
DeleteCandidates	Deletes multiple persons.
DeleteAllTestResults	Deletes results of specified persons.
GetInvitationLink	Creates new person and generates invitation link for online testing.
GetResultIDsForCandidate	Returns IDs of all results for a person.
GetVariableValuesForResult	Returns values of specified test variables from a test result.
GetResultAsSPSS	Returns test result exported in SPSS format.
GetControlMonitorEntries	Returns data from active test sessions currently in progress for individual machine.
GetControlMonitorEntriesUsingDepartmentFeature	Returns data from active test sessions currently in progress for individual machine filtered by department of the test person.
StartArchive	Triggers archiving process.

3.5.7.3.2.4 IUniversalPluginServiceStreamed operations

Operation name	Description
ImportTestResults ***(deprecated)***	*Deprecated - may be removed in a future version.*
GetResultAsPDF	Returns test result exported in PDF format.
GetResultAsCSV	Returns test result exported in CSV format.
GetWordReportAsPDF ***(deprecated)***	*Deprecated - may be removed in a future version.*

3.5.7.3.2.5 IUniversalPluginSpecialCaseService operations

Operation name	Description
GetTestProtocol ***(deprecated)***	*Deprecated - may be removed in a future version.*

Operation name	Description
GetFitValue ***(deprecated)***	*Deprecated - may be removed in a future version.*
GetTotalPresentedItemsCount ***(deprecated)***	*Deprecated - may be removed in a future version.*
AddCandidates ***(deprecated)***	*Deprecated - may be removed in a future version.*

3.5.7.3.2.6 Data types

The data types used in the available operations are specified in the WSDL document. The names of the fields should be self-explanatory.

3.5.7.4 Logging

The **VIS** and **Universal plugin** generate log data that can be used to analyze their functionality. This data is recorded in the following log file:

```
C:\ProgramData\Schuhfried\Logs\VTS.Integration.Service.log
```

3.5.8 VTSCommand tool

The **VTSCommand tool** is a command-line utility designed to export and save test results from the **Vienna Test System (VTS)** as `.xstp` archive files. In addition to archiving, the tool offers the following capabilities:

- **Result cleanup:** Optionally deletes all archived test results.
- **Person cleanup**: Optionally deletes person records from VTS if all associated test results have been successfully archived, if no test results exist, or if only unfinished tests are present.
- **Certificate management**: Allows replacement of the service's certificate with a different **X.509 certificate** to be used by VTS.

3.5.8.1 Preconditions

For the tool to work, the Universal plugin must be configured and running on port 9010. For more information about configuring the Universal Plugin, refer to the Universal Plugin Documentation.

Username and password in the configuration of the Universal plugin **must stay empty** for the VTSCommand tool to be able to connect to it.

Example of the section with the initial configuration of the Universal plugin in the appsettings.json

```
"Urls": "https://localhost:9010",
"UniversalPlugin": {
  "Enabled": "true",
  "DefaultTestBattery": "",
  "CertificateSearchKind": "FindBySubjectName",
  "CertificateSearchValue": "SchuhfriedSelfSignedCertificate",
  "UsernameToVisService": "",
  "PasswordToVisService": ""
},
```

3.5.8.2 Location of the tool

The tool is by default located in the folder `C:\Program Files\SCHUHFRIED GmbH\Vienna Test System 8\Tools\VTSCommand\VTSCommand.exe`

Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

3.5.8.3 Parameters

The following parameters define the specific actions the tool should perform.

Parameter		Description
Archiving functionality		
`-a`	Mandatory	Starts archiving functionality.
`-m MandantName`	Mandatory	Specification of the multi-client where the operation will be performed.
`-p Path`	Optional	Specifies the directory where the archive file will be saved. This location must be accessible to the service user under which the tool is running. If not specified, the archive will be saved by default to: `%ProgramData%\Schuhfried\Archive`
`-e`	Optional	Additionally performs CSV export of persons and creates .csv file.
`-d`	Optional	Deletes exported results. Additionally if all results of a person are deleted, person gets deleted as well.
`-w`	Optional	Includes persons without planned tests in the archiving process. If parameter `-e` is used, separate csv file containing persons without planned tests will be created. If parameter `-d` is used, persons who without planned tests will be deleted.
`-u`	Optional	Includes persons with unfinished tests in the archiving process. If parameter `-e` is used, separate csv file containing persons with unfinished tests will be created. If parameter `-d` is used, persons with unfinished tests will be deleted. -u
`-x minutes`	Optional	Specifies the maximum execution time in minutes. Once this time limit is reached, the export process will be stopped.
`-o days`	Optional	Limits archived results to those older than the specified number of days.
`-y`	Optional	If specified, the export will be anonymized. This applies to both the test results export and the optional CSV export of person data (using the `-e` option).
`-h`	Optional	Help command

Parameter		Description
Configuration of X509 Certificate		
`-c`	Mandatory	(Re)configure X509 Certificate for VIS & VTS
`-k`	Required if in combination with `-v`	Defines the certificate search kind. This is the field by which we will be finding the certificate in the Windows certificate store. Valid values are: `FindByThumbprint, FindBySubjectName, FindBySubjectDistinguishedName, FindByIssuerName, FindByIssuerDistinguishedName, FindBySerialNumber, FindByTimeValid, FindByTimeNotYetValid, FindByTimeExpired, FindByTemplateName, FindByApplicationPolicy, FindByCertificatePolicy, FindByExtension, FindByKeyUsage, FindBySubjectKeyIdentifier`
`-v`	Required if in combination with `-k`	Value used to search for the certificate in the Windows certificate store. Example: Use certificate subject name if `-k FindBySubjectName` or certificate thumbprint if `-k FindByThumbprint`
`-f`	Required if in combination with `-q`	Full path to the *.pfx file including filename
`-q`	Required if in combination with `-f`	Password to the *.pfx file
`-n`	Optional	If specified, the tool will not ask for user confirmation in the console

3.5.8.4 Using the tool for archiving

The **VTSCommand** tool supports both **manual archiving** and **automated archiving**, allowing flexible integration into your workflows. For automated use, the tool can be triggered by external schedulers such as **Windows Task Scheduler**, enabling daily or periodic execution for continuous archiving.

3.5.8.4.1 Archiving Options

You can configure the tool to:

- **Archive test results** while keeping them in the system, or
- **Archive and delete test results** from the system after archiving.

In addition to archiving, the tool supports:

- **Deleting persons** with no test results (e.g., created but never used),
- **Deleting persons** with **unfinished tests** (e.g., tests never started or abandoned),
- **Exporting persons** to a `.csv` file.

An **anonymization option** is available for the entire archiving process, allowing sensitive personal data to be anonymized both in archived data and exports, if required.

3.5.8.4.2 Archiving Scope and Retention

You can specify a **retention period** to control which test results are archived or deleted. Only test results older than the defined number of days are processed; newer ones remain in the system.

3.5.8.4.3 Example commands for archiving

The following command exports test results in mandant `W12345_001`. File with extension .xstp will be created in default archiving folder `%ProgramData%\Schuhfried\Archive`

```
VTSCommand.exe -m W12345_001 -a
```

The following command will export and delete all test results and corresponding persons provided they do not have any other unfinished or planned tests.

```
VTSCommand.exe -m W12345_001 -a -d
```

The following command will delete all exported test results and corresponding persons if they do not have any other unfinished or planned tests. Persons in the database with unfinished tests or no test results yet will also be deleted.

```
VTSCommand.exe -m W12345_001 -a -d -w -u
```

The following command will export and delete all test results older than 60 days. Corresponding persons will be also deleted provided they do not have any other unfinished or planned tests. If the export takes more than 8 hours, it will be stopped automatically.

```
VTSCommand.exe -m W12345_001 -a -d -o 60 -x 480
```

3.5.8.5 Using the tool for the configuration of X509 Certificate

The **VTSCommand** tool can be used to (re)configure which X.509 certificate is used by the VTS for the following purposes:

- Hosting TLS services (VIS & VTS)
- Encrypting generated reports

There are two ways to (re)configure the X.509 certificate for VIS and VTS:

1. By referencing an existing certificate installed in the **Local Machine Personal certificate store**
2. By providing the path and password to a `*.pfx` file that contains the certificate and its private key (the certificate will then be installed in the **Local Machine Personal certificate store**)

> ***Note:*** *The tool must be run with administrator privileges; otherwise, the operation will fail.*

3.5.8.5.1 Example commands for certificate configuration

The following command finds a certificate by thumbprint in the computer/my certificate store and configures it to be used by VIS & VTS.

```
VTSCommand.exe -c -k FindByThumbPrint -v
2e6ded878a02917790863e9436dc8878a4140a50
```

The following command installs a certificate from the given pfx file into computer/my certificate store and configures it for the use by VIS & VTS. It skips the (Yes/no) user approval in the console.

```
VTSCommand.exe    -c    -n    -f    c:\users\admin\desktop\mycert.pfx    -q
mypassword1234
```

3.5.9 Migration from 8.26 and earlier versions

Between versions 8.26.x and 8.27.x, the configuration file format for VIS and its plugins underwent a major change. In earlier versions, configuration was XML-based using .NET Framework 4.8. Beginning with version 8.27.x, it now uses the JSON format provided by .NET 8. This page describes the steps for upgrading a VTS with any VIS plugin (e.g., GDT, HL7, or Universal plugin) from version 8.26 or earlier to a newer version.

Beginning with version 8.27.x, VIS and all VIS plugins are configured through a single configuration file:

`%PROGRAMFILES%\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`

Note: This is the default installation path. If Vienna Test System was installed in a different location, the path will vary.

Each plugin has its own dedicated section within this file. When migrating existing VIS setups to a newer version, the settings from the previously separate configuration files must be transferred into these sections.

> It is highly recommended to back up the existing configuration files before starting the migration.

3.5.9.1 Migrate GDT plugin configuration

To migrate the configuration of the GDT plugin, the settings of the file by default located in `C:\Program Files (x86)\SCHUHFRIED GmbH\Wiener Testsystem 8\Service\Plugins\WTS.Integration.Plugins.GDT.GDTPlugin.dll.config` has to be migrated into the joint configuration file appsettings.json described above.

The table below shows how settings are mapped from the old structure to the new one:

8.26.x File: WTS.Integration.Plugins.GDT.GDTPlugin.dll.config	**8.27.x File: appsettings.json**
(no equivalent in older versions)	Section: GDTPlugin; Value: Enabled
(no equivalent in older versions)	Section: GDTPlugin; Value: TimeoutInSec
Section: appSettings; Value: GDTSourceDirectory	Section: GDTPlugin; Value: GDTSourceDirectory
Section: appSettings; Value: GDTOutputDirectory	Section: GDTPlugin; Value: GDTOutputDirectory
Section: appSettings; Value: GDTSender	Section: GDTPlugin; Value: GDTSender
Section: appSettings; Value: GDTReceiver	Section: GDTPlugin; Value: GDTReceiver
Section: appSettings; Value: MandantName	Section: AppSettings; Value: Service.MandantName
Section: appSettings; Value: PersonDefaultLanguage	Section: GDTPlugin; Value: PersonDefaultLanguage

8.26.x File: WTS.Integration.Plugins.GDT.GDTPlugin.dll.config	8.27.x File: appsettings.json
Section: appSettings; Value: PersonDefaultEducationLevel	Section: GDTPlugin; Value: PersonDefaultEducationLevel (without quotes)
Section: appSettings; Value: ExportRawScore	Section: GDTPlugin; Value: ExportRawScore (without quotes)
Section: appSettings; Value: PDFExportPath	Section: GDTPlugin; Value: PDFExportPath (backslashes doubled)
Same as Admin client setting *“Settings –> Data export/import –> Standard folder for data export”*	Section: GDTPlugin; Value: StandardExportFolder (backslashes doubled)
(no equivalent in older versions)	Section: GDTPlugin; Value: StoreProcessedFailedFiles
Section: ExportDefinitionGroup	Section: GDTPlugin; Value: ExportDefinitionGroup (please see the picture below)

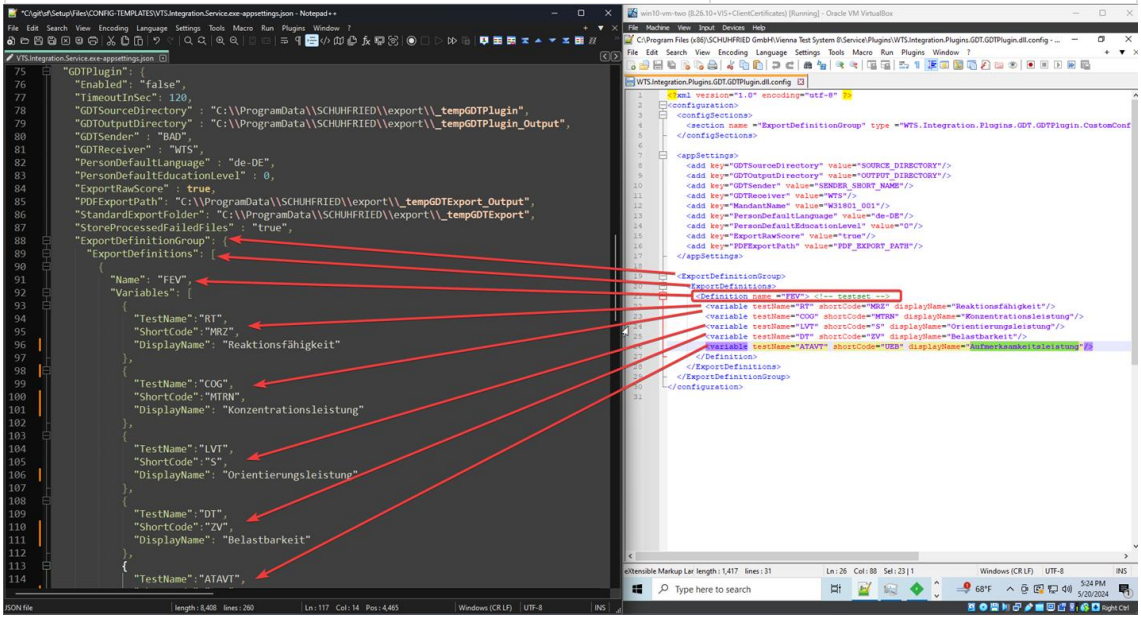


Figure 2 Mapping of GDT export definition group from XML to JSON

A detailed description of which values can be set in the configuration file can be found on the page: (8.29-en) (en-US) GDT plugin.

3.5.9.2 Migrate HL7 plugin configuration

To migrate the configuration of the HL7 plugin, the settings of the file by default located in `C:\Program Files (x86)\SCHUHFRIED GmbH\Wiener Testsystem 8\Service\Plugins\WTS.Integration.Plugins.HL7.HL7Plugin.dll.config` has to be migrated into the joint configuration file appsettings.json described above.

The table below shows how settings are mapped from the old structure to the new one:

8.26.x File: WTS.Integration.Plugins.HL7.HL7Plugin.dll.config	8.27.x File: appsettings.json
(no equivalent in older versions)	Section: HL7Plugin; Value: Enabled
Section: appSettings; Value: ReceivingApplication	Section: HL7Plugin; Value: ReceivingApplication
Section: appSettings; Value: ReceivingFacility	Section: HL7Plugin; Value: ReceivingFacility
Section: appSettings; Value: SendingApplication	Section: HL7Plugin; Value: SendingApplication
Section: appSettings; Value: SendingFacility	Section: HL7Plugin; Value: SendingFacility
Section: appSettings; Value: Mode	Section: HL7Plugin; Value: Mode
Section: appSettings; Value: FileShareBasePath	Section: HL7Plugin; Value: FileShareBasePath (doubled backslashes)
Section: appSettings; Value: TCPClientRemoteHost	Section: HL7Plugin; Value: TCPClientRemoteHost
Section: appSettings; Value: TCPClientRemotePortORU	Section: HL7Plugin; Value: TCPClientRemotePortORU
Section: appSettings; Value: TCPClientRemotePortMDM	Section: HL7Plugin; Value: TCPClientRemotePortMDM
Section: appSettings; Value: TCPListenerPort	Section: HL7Plugin; Value: TCPListenerPort
Section: appSettings; Value: TCPSendTimeout	Section: HL7Plugin; Value: TCPSendTimeout
Section: appSettings; Value: SendAck	Section: HL7Plugin; Value: SendAck

A detailed description of which values can be set in the configuration file can be found on the page: (8.29-en) (en-US) HL7 plugin.

3.5.9.3 Migrate Universal plugin configuration

To migrate the configuration of the Universal plugin, the settings of the file by default located in `C:\Program Files (x86)\SCHUHFRIED GmbH\Wiener Testsystem 8\Service\Plugins\WTS.Integration.Plugins.Universal.UniversalPlugin.dll.config` has to be migrated into the joint configuration file appsettings.json described above.

The table below shows how settings are mapped from the old structure to the new one:

8.26.x File: WTS.Integration.Plugins.Universal.UniversalPlugin.dll.config	8.27.x File: appsettings.json
(no equivalent in older versions)	Section: UniversalPlugin; Value: Enabled
Section: appSettings; Value: DefaultTestBattery	Section: UniversalPlugin; Value: DefaultTestBattery

8.26.x File: WTS.Integration.Plugins.Universal.UniversalPlugin.dll.config	8.27.x File: appsettings.json
Section: serviceCertificate; Value: x509FindType	Section: UniversalPlugin; Value: CertificateSearchKind
Section: serviceCertificate; Value: findValue	Section: UniversalPlugin; Value: CertificateSearchValue
Section: appSettings; Value: UniversalPluginAuthUserName	Section: UniversalPlugin; Value: UsernameToVisService (optional)
Section: appSettings; Value: UniversalPluginAuthPassword	Section: UniversalPlugin; Value: PasswordToVisService (optional)
Section: appSettings; Value: ImportPersonsFromCSV	Section: ImportExportPlugin; Value: ImportPersonsFromCSV
Section: appSettings; Value: ExportTestResultsToCSV	Section: ImportExportPlugin; Value: ExportTestResultsToCSV
Section: appSettings; Value: MandantName	Section: ImportExportPlugin; Value: MandantName
Section: appSettings; Value: ImportExportInterval	Section: ImportExportPlugin; Value: ImportExportInterval (without quotes)
Section: appSettings; Value: ExternToInternCandidatesMap	Section: ImportExportPlugin; Value: ExternToInternCandidatesMap
Section: appSettings; Value: ExternPersonsCsvFilePath	Section: ImportExportPlugin; Value: ExternPersonsCsvFilePath (doubled backslashes)
Section: appSettings; Value: ExportResultsCsvFilePath	Section: ImportExportPlugin; Value: ExportResultsCsvFilePath (doubled backslashes)
Section: appSettings; Value: CsvExportProfile	Section: ImportExportPlugin; Value: CsvExportProfile Section: PisaExportPlugin; Value: CsvExportProfile
Section: appSettings; Value: User	Section: ImportExportPlugin Value: User Section: PisaExportPlugin; Value: User
Section: appSettings; Value: ExportLanguage	Section: ImportExportPlugin; Value: ExportLanguage
Section: appSettings; Value: StorageFolder	Section: ImportExportPlugin; Value: StorageFolder (double backslashes)
(no equivalent in older versions)	Section: ImportExportPlugin; Value: PortalApiAddress

8.26.x File: WTS.Integration.Plugins.Universal.UniversalPlugin.dll.config	8.27.x File: appsettings.json
Section: appSettings; Value: enableClientTestresultListener	Section: PisaExportPlugin; Value: enableClientTestresultListener (without quotes)
Section: appSettings; Value: ExportInterval	Section: PisaExportPlugin; Value: ExportInterval (without quotes)
Section: appSettings; Value: Scoringmethod	Section: PisaExportPlugin; Value: Scoringmethod
Section: appSettings; Value: WordTemplateName	Section: PisaExportPlugin; Value: WordTemplateName
Section: appSettings; Value: UseWordTemplateForPDFGeneration	Section: PisaExportPlugin; Value: UseWordTemplateForPDFGeneration (without quotes)
Section: appSettings; Value: Endpoint	Section: PisaExportPlugin; Value: Endpoint
Section: appSettings; Value: SoapAction	Section: PisaExportPlugin; Value: SoapAction
Section: appSettings; Value: ClientCertificateSearchKind	Section: PisaExportPlugin; Value: ClientCertificateSearchKind
Section: appSettings; Value: ClientCertificateSearchValue	Section: PisaExportPlugin; Value: ClientCertificateSearchValue

A detailed description of which values can be set in the configuration file can be found on the page: (8.29-en) (en-US) Universal plugin.

The Universal plugin provides a SOAP-based web service implemented with the WCF framework, which is extensively configurable through traditional XML configuration. In addition to the general plugin settings defined in `appsettings.json`, the Universal plugin therefore uses a separate configuration file for WCF-specific settings:

```
%PROGRAMFILES%\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\Plugins\VTS.Integration.Plugins.Universal.dll.wcf.config
```

Note: This is the default installation path. If Vienna Test System was installed in a different location, the path will vary.

The default WCF configuration is designed to cover the majority of use cases and typically remains unchanged in standard deployments.

3.6 Advanced topics

3.6.1 Install licenses

In the Vienna Test System (VTS), there are several options for installing licenses:

1. If you are using **VTS version 8.28 or later and have an internet connection**, you will find the instructions on the page: Using VTS version 8.28 or later, with internet connection
2. If you are using **VTS version 8.28 or later but do not have an internet connection**, you will find the instructions on the page: Using VTS version 8.28 or later, without internet connection

3. If you are using **VTS version 8.27 or earlier**, you will find the instructions on the page:
   Using VTS version 8.27 or earlier

Notes on license installation

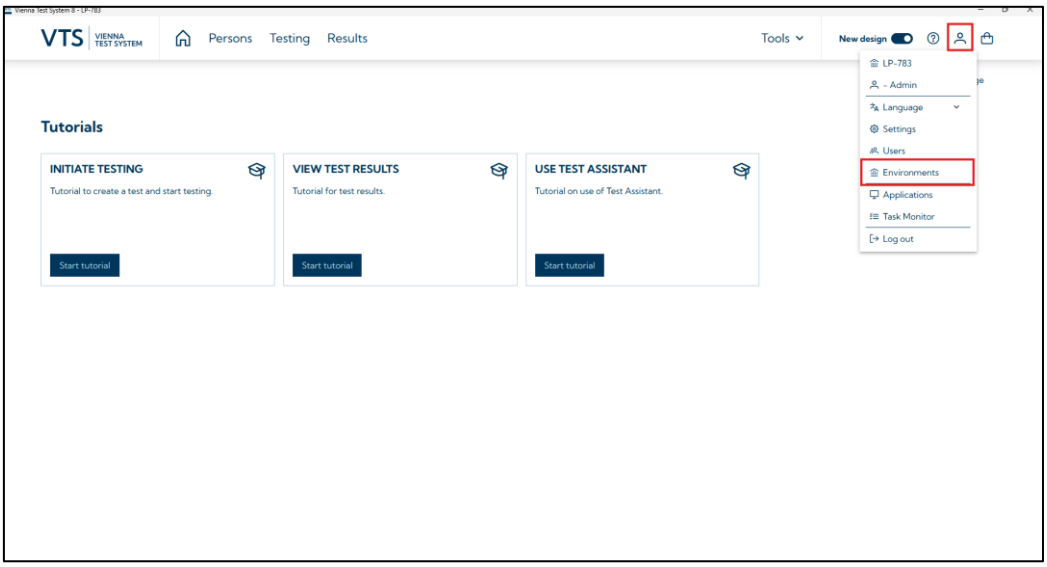
- When you install the VTS administration software for the first time, you will receive either a product key by email or a VTS dongle containing the licenses. How to install the administration software is described on the page Installation and configuration .
- In **VTS online, you do not need to import your purchased licenses separately**. After you have purchased the test licenses for your VTS online in the Marketplace, they are automatically stored for you and ready to use.
- In special cases (especially when installing server/client systems on hardware without internet connection), it may be necessary to install the license before installing the VTS administration software. You will find the corresponding instructions on the page Installation via the Sentinel Admin Control Center.
- If you are using VTS offline, the licenses (license files) for tests or for updating the administration software will be sent to you by email after purchasing the respective products and will be in the format *.v2c* or *.sflic.*

3.6.1.1 Using VTS version 8.28 or later, with internet connection

Starting with VTS version 8.28, you can switch between two different designs of the administration software. If you are using the older design (dark gray color scheme), please install the update as described on the page (en-US) Using VTS version 8.27 or earlier.

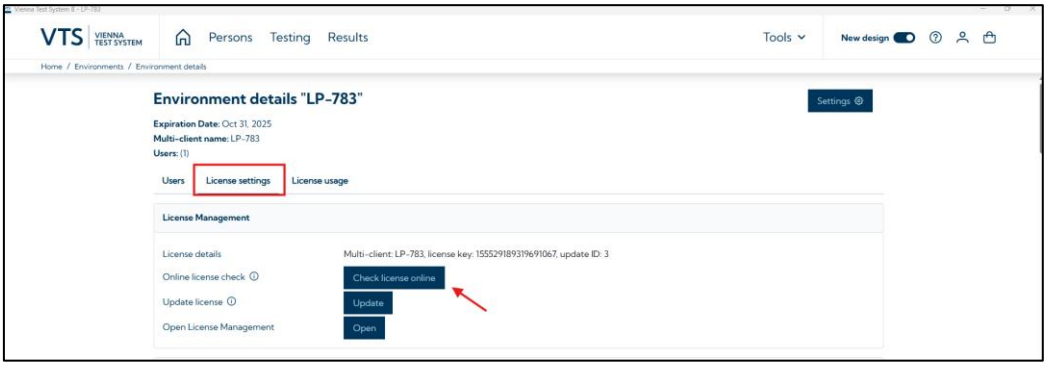
If you are using the new design (white and light blue color scheme) that is enabled by default and your computer has an internet connection, please follow these steps:

1. If you have received a VTS dongle (USB stick), please connect it to your PC.
2. Start the Vienna Test System and click on the icon for your personal account in the top right corner.
3. There, please open your *Environments:*

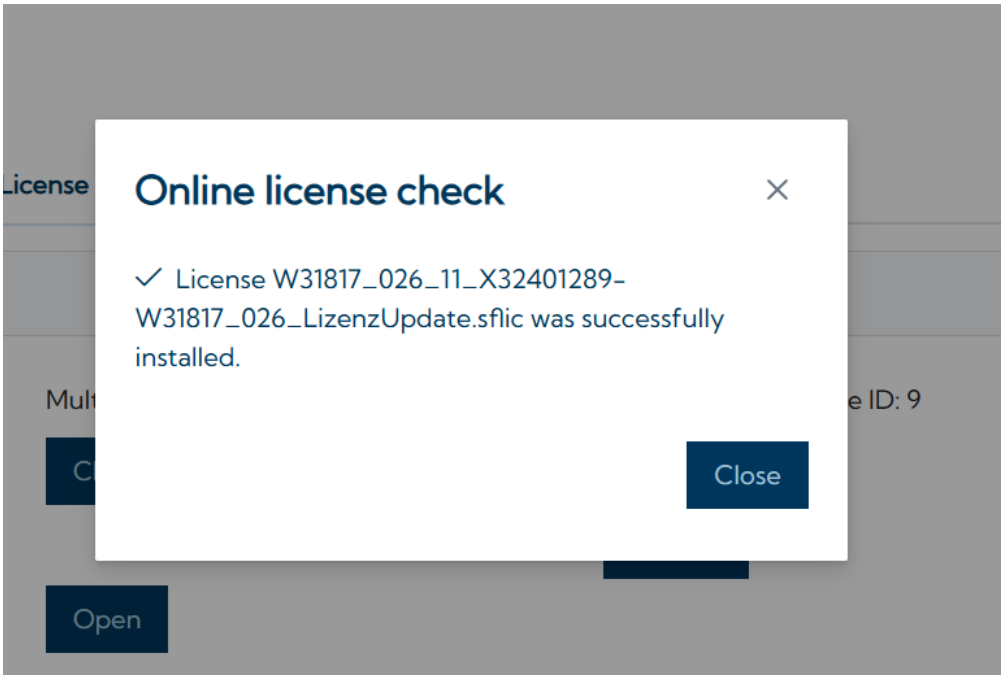


4. Select the workstation you want to update.

5. Go to *License settings*, where you will find the *License Management* section.
6. Click on the button *Check license online.* The VTS will check whether new licenses are available (an active internet connection is required for this).



7. If you have already purchased new licenses, they will now be installed automatically and you will see the following information:



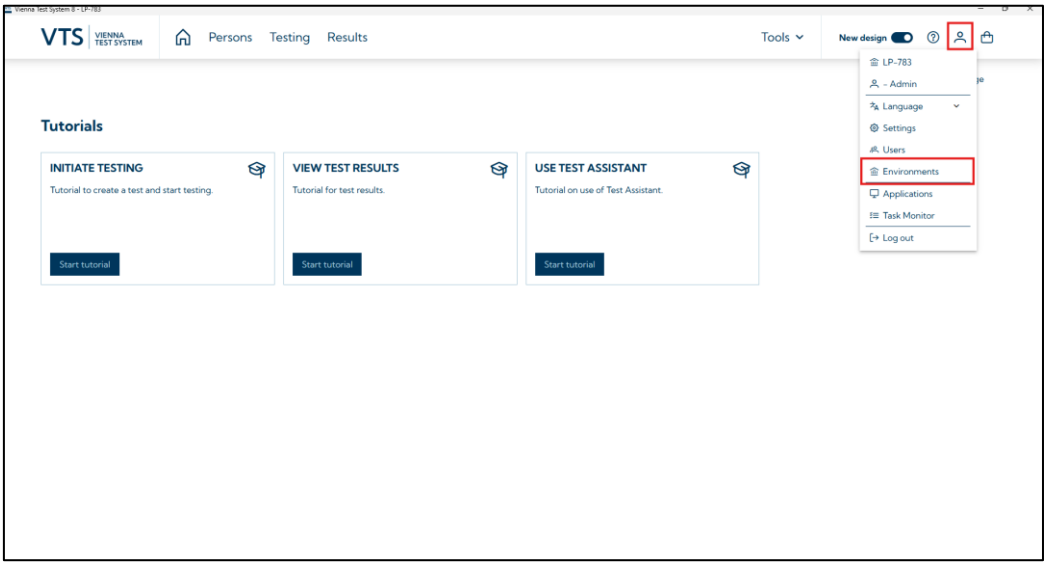
8. The new licenses are now available in your Vienna Test System.

3.6.1.2 Using VTS version 8.28 or later, without internet connection

> Starting with VTS version 8.28, you can switch between two different designs of the administration software. If you are using the older design (dark gray color scheme), please install the update as described on the page Using VTS version 8.27 or earlier.

If you are using the new design that is enabled by default (white and light blue color scheme) and the computer does **not have an internet connection**, please follow these steps:

1. Save the license file(s) you received by email on the PC on which the VTS is installed, or download the license file(s) directly from the Marketplace under your order details.
    a. Alternatively, you can use a data carrier (e.g., USB stick) that the VTS can access. Connect the data carrier with the licenses to the PC where the VTS is installed.
2. If you have received a VTS dongle (USB stick), please connect it to your computer.
3. Start the Vienna Test System (administration software) and click on the icon for your personal account in the top right corner.
4. There, please open your *Environments:*



5. Select the workstation you want to update.

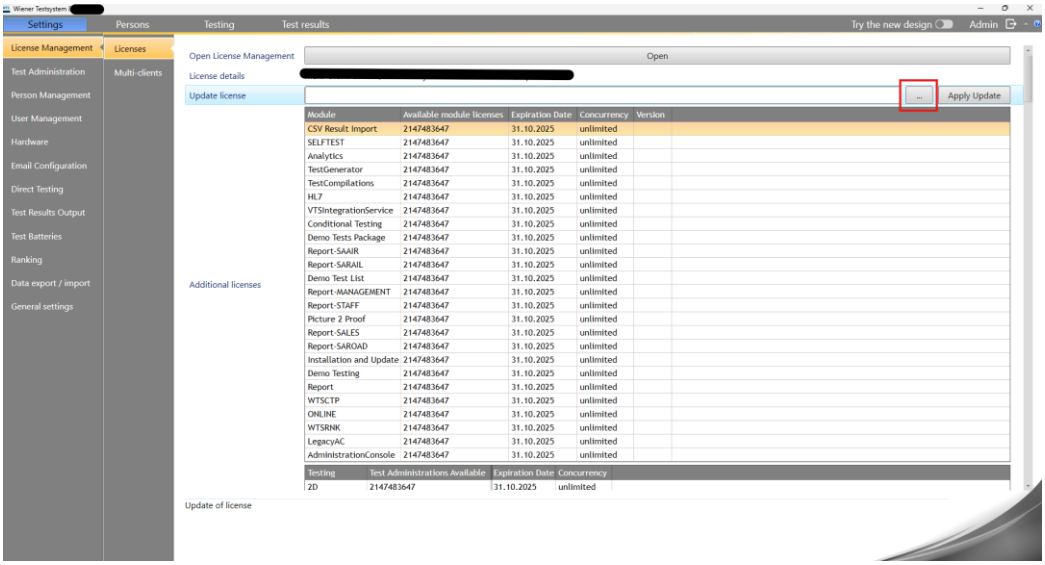
6. Go to the *License settings* tab.
7. Load the new license file by clicking *Update* and selecting the appropriate license file. After selecting the license file, click *Open*.

8. The new licenses will be installed and are now available in your Vienna Test System.

3.6.1.3 Using VTS version 8.27 or earlier

To install the licenses, please proceed as follows:

1. Save the license file(s) on the computer running the Vienna Test System or on a data carrier that can be accessed by the Vienna Test System.
    a. Please note that for software versions up to and including 8.8, files with the extension .v2c must be used. From version 8.8 onwards, files with the extension .sflic should be used.
2. If you have received a VTS dongle (USB stick), please connect it to your computer.
3. Start the Vienna Test System and go to *Settings --> License Management --> Licenses:*



4. Select the license file by clicking on the button with the three dots in the *Update License* line (marked in red in the screenshot above). After selecting the license file, please click *Open*.
5. Click on the *Apply Update* button. The new licenses will now be installed and available in your Vienna Test System.

Please note

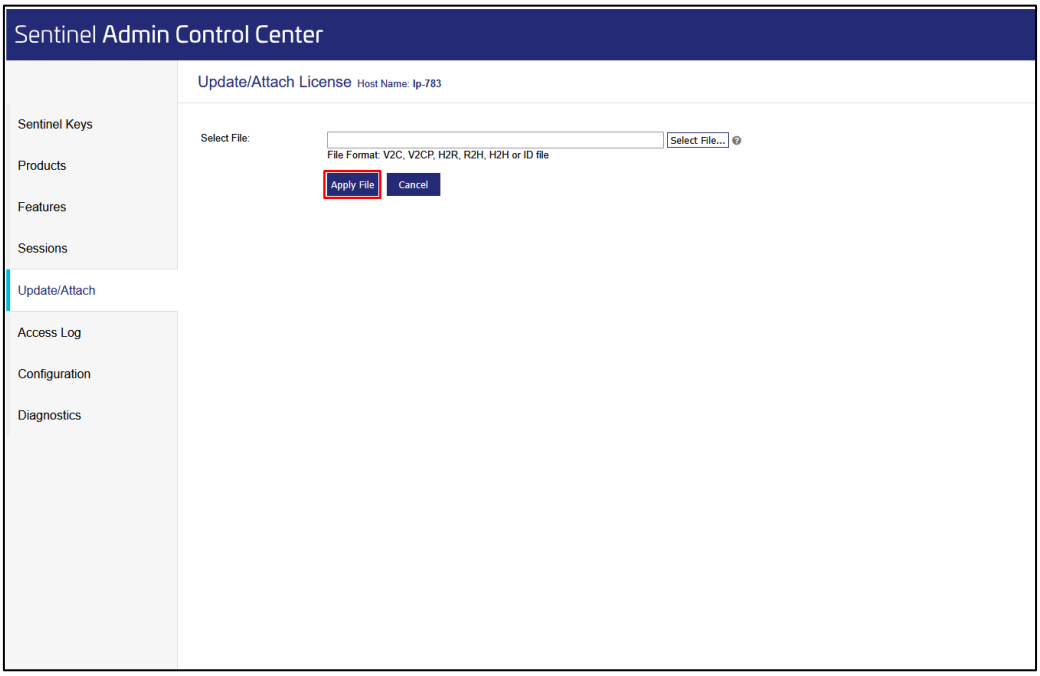
- If you are using license files with the extension .v2c, all previously issued license files must be imported before installing the current license file(s).
- Updates to the VTS administration software are protected by a separate license. Before the actual update installation, the system checks whether the necessary license for the update is available.

3.6.1.4 Installation via the Sentinel Admin Control Center

If you are using a software dongle, you must import the required licenses via the *Sentinel Admin Control Center* (license management) **before** installing the VTS.

> Only license files with the extension .v2c can be installed via license management.

1. Open your internet browser and enter http://localhost:1947 in the address bar.
2. The *Sentinel Admin Control Center* opens.
3. Select *Update/Attach* in the left navigation bar.
4. Open the license file with *Select File…*.
5. Click on *Apply File* to install the licenses.



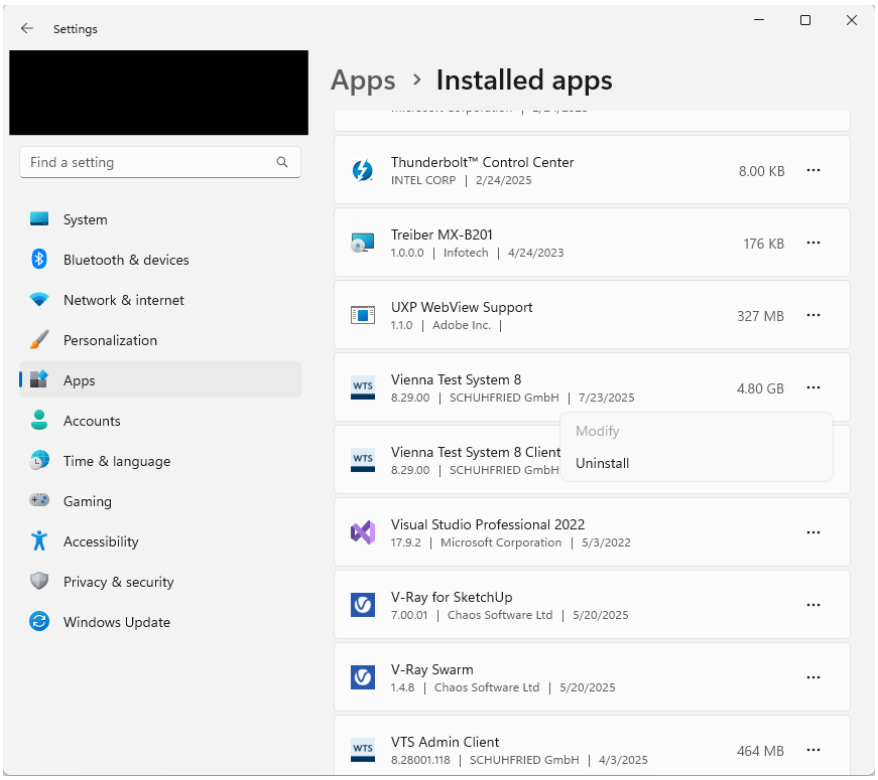
6. You will receive a confirmation message once the licenses have been successfully installed.
7. You will now see the licenses in the *Products* area.

In the VTS administration software, *license management* can be opened on the *Environment Details* page. Licenses for testing can also be installed via license management if necessary.

3.6.2 Uninstalling VTS

To uninstall VTS, proceed as follows:

1. Open Settings (Windows key + I).
2. Go to *Apps* → *Installed apps.*
3. Uninstall VTS.



The databases, and thus all persons and results, **remain** on your system even if the VTS has been uninstalled. Further steps are necessary to remove all files. Please contact our Support for further information.

3.6.3 Backup & recovery of the VTS

The VTS offers the option of backing up the entire system and restoring it. This can be done either

- on the same computer
- on another computer

However, there are a few things to bear in mind and all relevant files must be backed up.

There are two locations where the VTS stores data and which must be backed up accordingly:

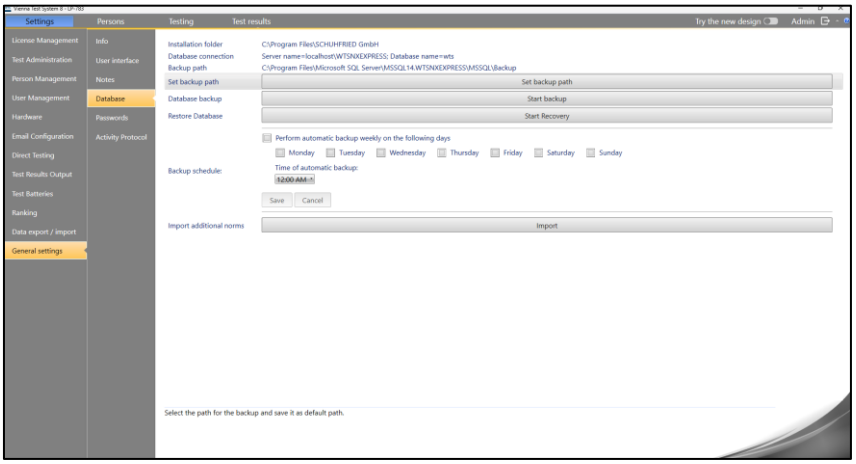
1. The *wts* and *dtc* databases in the SQL server

2. The *WordTemplate* folder under `%PROGRAMDATA%\schuhfried\media`

3.6.3.1 Backing up files

1. We recommend setting up a folder backup (using *Windows Backup* or by manually copying the folder to a safe location) for the *WordTemplate* folder located at %PROGRAMDATA%\schuhfried\media.
2. For the SQL server, VTS offers a built-in function that can be used to trigger an **automatic backup of the SQL server database**. VTS offers the option of defining a backup plan that automatically triggers the backup of the SQL server database according to a weekly schedule. We recommend using this function to set up a backup.
    a. In the VTS user interface, go to *Settings* → *General Settings* → *Database* and configure an automatic backup using the appropriate settings. This is only possible in the old VTS user interface. If necessary, deactivate the option *New design:*

        i. Make sure that the backup is only performed when the VTS is not in use.



3. In addition, a **manual backup of the SQL database** can be performed:
    a. Stop the *WTS Service*.
    b. Open the *Task Manager* → *Services* → right-click on *WTS Service* → *Stop*
    c. Copy the files in the folder: `%PROGRAMDATA%\Schuhfried\SQLDatabase` to another secure folder.
    d. Restart the *WTS Service*.

3.6.3.1.1 Restoring the VTS on the same computer

1. You can restore the VTS to a previous, functional state by importing the file created by the automatic backup using the *Restart restoration* function.

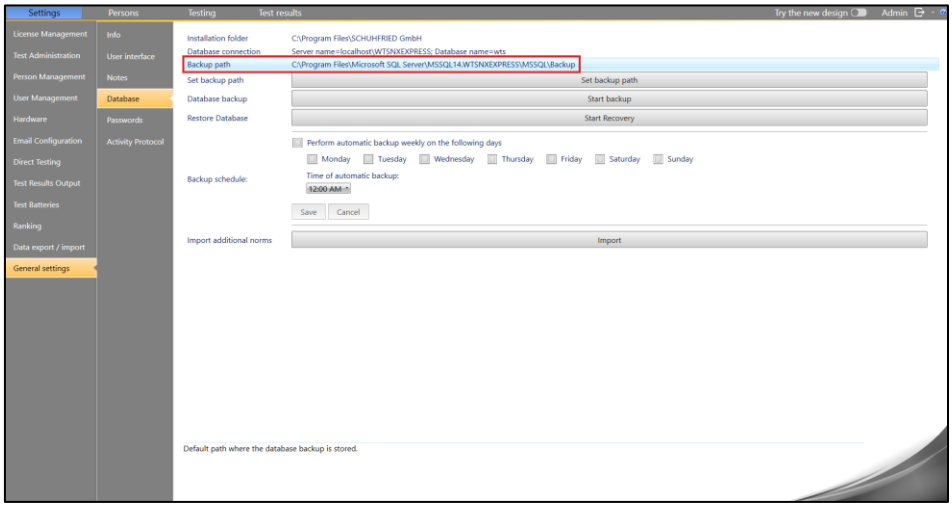
a. It is not possible to import a backup file that was created with an older version of VTS.

2. Restoring the *WordTemplate* folder is not usually necessary, as the folder is still available on the same computer.

3.6.3.1.2 Restoring the VTS on another computer

This procedure can be useful if you need to use a new PC and want to transfer the data from the VTS that was installed on your old PC. To do this, proceed as follows:

1. Perform a backup on the old machine and save the SQL database *wts* and *dtc* as described above.
2. Perform a manual backup of the *WordTemplate* folder under %PROGRAMDATA%\schuhfried\media (copy it to a USB stick, for example).
3. Install the VTS on the new PC (see Installation and configuration).
4. Copy the files created with the backup from the old computer to the corresponding folder on the new computer.
    a. The path to which the backup files of the SQL database must be copied can be read from the VTS administration software.



5. Start the recovery via *Start Recovery*.
6. Copy the backed up folder *WordTemplate* to the path %PROGRAMDATA%\schuhfried\media on the new PC.
7. If you did **not** select *'localhost' as the server address* in the server settings when installing VTS (i.e., you are hosting VTS at an address other than localhost), you must configure the SQL database using the `update_identityserverconfiguration.sql` script.

3.6.3.1.2.1 Notes

- The VTS version on the old and new PCs must be the same.
- The appropriate licenses must be available for installation on the new PC.

3.6.4 Security levels of VTS users

During installation of the VTS, a first user of the VTS is created. With this user, you can start using the Vienna Test System right after installation. The necessary access data is defined during installation (see Single workstation installation or Server/client installation).

The user created during installation is automatically assigned the highest security level (Admin, security level 0). This user can **create new users** and **define their permissions**, as well as change all settings in the Vienna Test System.

When creating additional users in the Vienna Test System, there are different security levels that can be used to configure access to the settings and to the data in the system.

> **Note:** There must always be one user who has the highest security level 0. Otherwise, the Vienna Test System can no longer be administered.

The following security levels are possible:

Security level	Authorization
0	All functions and settings of the Vienna Test System are accessible at this security level.
1	No settings can be changed at this security level. This means that no users can be added, no test batteries can be created or changed, no basic settings (e.g., folder for data storage) can be changed, and no tests can be installed. However, the Vienna Test System can be used for test presentation and access to the databases is unrestricted.
2	At this security level, the Vienna Test System can only be used for test presentation and scoring. The other functions are locked. The test results are only available to a limited extent: Only data records saved during test presentation can be scored after test presentation. Other test results cannot be called up.
3	At this security level, the Vienna Test System can only be used for test presentation. All other functions and access to the database are completely blocked.

3.6.5 Manual changes after installation

3.6.5.1 1. Changing the machine name after installation

If a full SSL certificate is not used, the machine name should be avoided from being changed under any circumstances once the Vienna Test System has been installed. The supplied self-signed SSL certificate is linked to the original machine name. If the machine name is changed, communication between the VTS components will no longer be correctly configured.

If this does happen, the following steps should be taken:

1. Uninstall the Vienna Test System (the database will not be deleted)
2. Make sure that the certificate “SchuhfriedSelfSignedCertificate” is deleted:
    a. Open the *Certificate Management*, run *certlm.msc* on the local computer.
    b. Go to *Personal* → *Certificates.*
    c. Right-click on *SchuhfriedSelfSignedCertificate* and select *Delete*.
3. Reinstall the Vienna Test System (the existing database will be recognized and used).

4. Make adjustments to the VTS database using an SQL script to apply the new computer names:
    a. Run the SQL script: *update_identityserverconfiguration.sql*. The script is located in the installation files in the Scripts\Help folder.
    b. It is important that the same version of the Vienna Test System is used when uninstalling and reinstalling the software.

3.6.5.2 2. Change the Bit.ly configuration

The VTS uses the external tool “Bitly” to send invitation links via email to the test takers. The following changes can be made to the configuration:

3.6.5.2.1 1. IsBitlyEnabled

This key can be used to enable or disable the Bitly service. Valid values are ‘true’ and “false.” Here is an example:

```
<add key="IsBitlyEnabled" value="false"></add>
```

3.6.5.2.2 2. BitlyAccessToken

This key can be used to overwrite the system's default token. For example, you can use your own Bitly account. Here is an example:

```
<add key="BitlyAccessToken" value="123456789abcdefghijk"></add>
```

3.6.6 Manual installation of the VTS SQL database

This guide explains how **to manually install the VTS database on a Microsoft® SQL Server using a script**. The required Microsoft® SQL Server version can be found in the system requirements for the VTS version to be installed.

These instructions **apply if you are performing a customized installation of VTS for the first time** and prefer not to use the provided Microsoft® SQL Server Express version.

If you are updating a VTS installation that uses a manually installed SQL Server, you must also update the SQL Server or the corresponding VTS databases manually using scripts. You can find the instructions here Manual update of the VTS SQL database.

3.6.6.1 Prerequisites

- The SQL server is installed (the version corresponds to the system requirements of the VTS version to be installed).
- You have the SQL Server login data with sufficient rights to create further logins.
- You have permission to execute scripts with the user `sa`.
- You have the necessary SQL scripts for creating the database. These can be found in the VTS installation files (setup) in the `Scripts` folder.

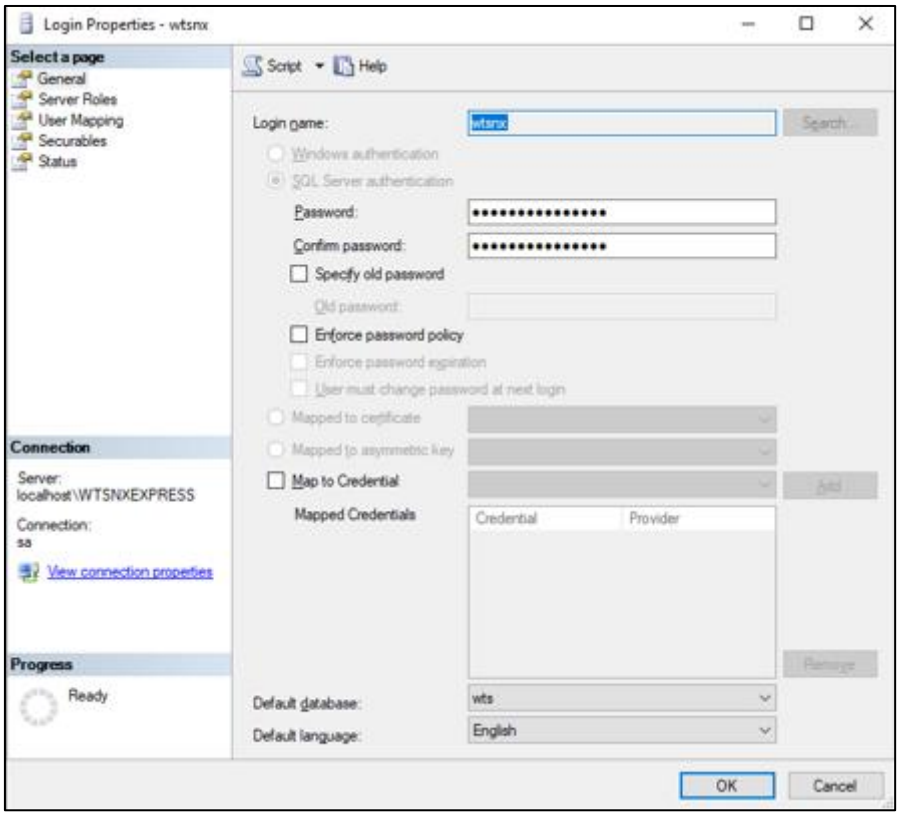
3.6.6.2 Preparing the SQL Server

Before the database can be set up using the scripts, a login “wtsnx” must be created in the designated database instance. **This is mandatory for the installation!**

> You will receive the login password from technical support. Please contact our Support for this.

1. **Creating the login “wtsnx” with Microsoft SQL Server Management Studio:**
    a. Connect to the appropriate SQL Server instance.
    b. Navigate to **Security --> Logins** and add a login with the following details:

- **Login name**: `wtsnx`
- **Login type**: SQL Server authentication
- **Password**: Contact our Support
- **Enforce password policy**: Deactivate this option



3.6.6.3 Creating the databases for installing the VTS

In this step, all databases required for installing the VTS are set up one after the other using the corresponding scripts.

The following databases must be created:

- *WTS* database: contains person and test data
- *DTC* database: contains information for the browser-based user interface.
- *WTSKatalog* database: contains metadata (only for VTS version 8.28 or older)

> The scripts are located in the installation files under `Scripts\First Installation`. `v8.X.X` stands for the corresponding VTS version. For example, if you are installing VTS 8.29, the scripts are labeled v8.29.0.

3.6.6.3.1 1. Creating the WTS database

Execute the following scripts one after the other in the exact order specified and observe the notes below on executing the scripts!

1. `wts_1_create_database_v8.X.X.sql`

2. wts_2_create_tables_v8.X.X.sql
3. wts_3_insert_data_v8.X.X.sql
4. wts_4_optimize_database_v8.X.X.sql

3.6.6.3.1.1 Notes on executing the scripts

- Make sure that the database is created with the collation **Latin1_General_CI_AI**.
- Make sure to execute the scripts with *sa* user (or a user with equivalent rights).
- By default, a database with the name **wts_deploy** is created.
  - Do **not use a hyphen ('-')** if you use a different name for the database.
  - If a different name is to be used when creating the database, the four SQL scripts must be adjusted accordingly.
- Scripts 1, 2, and 4 can generally be executed from Microsoft SQL Server Management Studio.
- Execute script 3 **via the "sqlcmd" command line**. The command for this is**:** `sqlcmd -S <NameorIPofSQLServer>\<InstanceName> -U sa -P <password> -d <DatabaseName> -i <path to script & scriptname.sql>`
  - Correct installation can only be guaranteed with the user "sa"!

3.6.6.3.1.2 Example of the installation command for script 3

```
sqlcmd  -S localhost\wtsnxexpress
        -U sa
        -P 1234
        -d wts
        -i C:\temp\wts_3_insert_data_v8.15.1.sql
```

3.6.6.3.2 2. Creating the DTC database

Execute the following scripts one after the other in the exact order specified and observe the notes below on executing the scripts!

1. dtc_1_create_database_v8.X.X.sql
2. dtc_2_create_tables_v8.X.X.sql

3.6.6.3.2.1 Notes on executing the scripts

- Make sure that the database is created with the collation **SQL_Latin1_General_CP1_CI_AS**.

3.6.6.3.3 3. Creating the VTS catalog database

This step is only necessary if you are installing with VTS version 8.28 or earlier. This database is no longer necessary as of VTS version 8.29.

1. In Microsoft® SQL Server Management Studio:
   a. Right-click on Databases and select *Append*.
   b. Click on the *Add* button and select the file `WTSKatalog.mdf`.
   c. **Important**: If necessary, enter the name `WTSKatalog` in the *Append as* column field.
   d. **Caution:** Change the file path in the *Current File Path* column to the .mdf and .ldf files in the extracted folder.

2. Then run the `productdb_1_update_schema_v8.X.X.sql` script on the `WTSKatalog`database.

3.6.6.3.3.1 Notes on executing the scripts

- Make sure that the database is created with the collation **SQL_Latin1_General_CP1_CI_AS**.
- Make sure that the WTSKatalog database is linked to the `wtsnx` user.

3.6.7 Manual update of the VTS SQL database

This guide describes how to perform a manual update to a new version of the VTS database. This guide only applies if you want to update a VTS installation that does not use the provided Microsoft® SQL Server Express version. For such VTS installations, the update cannot be performed by the setup program, but must be done manually instead.

3.6.7.1 Prerequisites

- You have the necessary scripts for the update. These can be found in the installation files in the `Scripts` folder.
- If you are using a VTS version older than VTS version 8.25.00, the password for the SQL login `wtsnx` be changed. Please contact our Support for assistance.

3.6.7.1.1 1. Update the VTS database

> The scripts are located in the installation files under `Scripts\Update Installation`. `v8.X.X` stands for the corresponding VTS version. If you install VTS 8.29, for example, the scripts are labeled v8.29.0.

Execute the following scripts one after the other in the exact order specified and observe the notes below on executing the scripts!

1. `wts_1_update_schema_v8.X.X.sql`
2. `wts_2_update_data_v8.X.X.sql`
3. `wts_3_optimize_database_v8.X.X.sql`

3.6.7.1.1.1 Notes on executing the scripts

- All scripts can be executed in Microsoft® SQL Server Management Studio.

3.6.7.1.2 2. Update the DTC database

- Execute the script `dtc_1_update_schema_v8.X.X.sql`.

> If you are updating from a VTS version that did not yet use a DTC database, first create a DTC database. A description can be found on the page: Manual installation of the VTS SQL database (section 2).

3.6.7.1.3 3. Update the WTSKatalog database

> This step is only necessary if you are installing with a VTS version 8.28 or earlier. From VTS version 8.29 onwards, this database is no longer necessary.

1. Delete the currently used WTSKatalog database and attach the current version of the WTSKatalog database.

a. A description of how to attach the current WTS catalog database can be found on the page: Manual installation of the VTS SQL database (section 3).

b. **Note**: If you are updating from a VTS version that did not yet use a VTS catalog database, it is sufficient to attach the current VTS catalog database for the update as described in point a).

2. Run the script `productdb_1_update_schema_v8.X.X.sql`

3.6.8 Silent installation via command line

The VTS administration software can also be installed via the command line. With this type of installation, no visible setup is started. All necessary parameters are transferred via the installation command.

3.6.8.1 Installation command

The installation command has the following structure:

```
WTS8setup.exe /qX DEFAULT_CULTURE="de-DE" AC_USERNAME_PROP="Admin" AC_PASSWORD_PROP="xxx" WTS_SERVICE_PORT="7001" WTS_PORTAL_PORT="7011" WTS_PORTAL_URL="xxx"
```

This command can be supplemented with additional optional parameters. For example:

```
LICENSE_FILE="c:\TEMP\W12345_001_01_ID21_31001_Lizenz.v2c"
APPDIR="C:\Program Files\Wiener Testsystem 8"
ICON_TP="1"
/L*V "%temp%\WTS8Silent.log"
```

3.6.8.2 Explanation of parameters

The possible parameters are:

Parameter	Value	Description
/qx	1. qr 2. qb 3. qn	1. Display installation progress 2. Display installation progress as progress bar only (without details) 3. No display of installation progress
DEFAULT_CULTURE	de-DE, en-US, …	**Mandatory parameter for initial installation** Determines the language of the administration software and the testplayer. This information is absolutely necessary! The possible languages are listed below: Silent installation via command line. The language of the administration software can also be changed after installation.
AC_USERNAME_PROP	Text	**Mandatory parameter for initial installation**

Parameter	Value	Description
		Defines the name of the first user for the Vienna Test System.
AC_PASSWORD_PROP	Text	Defines the password for the user defined by **AC_USERNAME_PROP**. **If NO_AC_PASSWORD is set to 0, this parameter must be used!**
NO_AC_PASSWORD	0 or 1	If the parameter is set to 1, no password is required for login. In this case, other suitable measures must be taken to ensure data protection in accordance with the GDPR. If a password is assigned with **AC_PASSWORD_PROP**, this parameter can be omitted.
PRODUCT_KEY	Text	Specifies the product key if a software dongle is installed with one.
LICENSE_FILE	Text	Specifies the path for a v2c license file if it is to be imported during installation. This is **not necessary** for a first-time installation.
APPDIR	Path	This entry determines the path in which the Vienna Test System is to be installed. If this parameter is not specified, it is the installation directory: *C:\Program Files (x86)\Schuhfried GmbH\Vienna Test System 8*.
ICON_TP	0 or 1	If this parameter is set, the setup creates an icon for the testplayer on the desktop and an entry in the Start menu.
/L*V	Text	This parameter specifies the complete path to a file in which a log file of the installation is created. The file is created during the installation.
/exelang	1031 or 1033	1031: starts the setup in German 1033: starts the setup in English This parameter is optional.
WTS_PORTAL_URL	Text	Specifies the address at which the VTS portal should be accessible. This value should be either the domain name or the machine name (default=machine name). The corresponding URL should be specified.
WTS_SERVICE_PORT	7001	**Mandatory parameter** Specifies the port for the WTS service. A free port in the range 7001 to 7999 must be specified here, via which the VTS clients communicate with the WTS service on the server.

Parameter	Value	Description
WTS_PORTAL_PORT	7011	Specifies the **base port for the VTS portal**. A free port in the range 7001 to 7999 must be specified here. Please note that seven additional consecutive ports will also be used. This specification is optional. If the default value (7011) is used, the following ports are used: 7011, 7012, 7013, 7014, 7015, 7016, 7017, 7018.
LICENSE_SERVER_ID	Text	Specifies the IP address or name of the license server in the network, if one is used. This parameter must only be specified if the dongle is connected to a separate license server. In this case, the license server is not the server on which the VTS is installed. The default value is `localhost`. For details, see steps 7 and 8 of the instructions for installing a server/client system.
DB_SERVER_INSTANCE	Text	Specifies the server name of the SQL server (only to be specified if a user-defined SQL server is to be used).
DB_CATALOG_NAME	Text	Specifies the catalog name of the SQL server (only to be specified if a user-defined SQL server is to be used).
SQL_SA_USER	Text	Specifies the login name of the SQL server system administrator (only if a user-defined SQL server is used and the sa user can be specified).
SQL_SA_PASSWORD	Text	Specifies the password of the SQL server system administrator (only if a user-defined SQL server is used and the sa password can be specified).
MANDANT_ID	Text	This parameter can be used to set the multi-client with which the testplayer should start (e.g. W12345_001). If “AUTO” is entered, the first multi-client found on the server is selected. If the multi-client is to be entered each time the program is started, MANDANT_ID="-" must be specified.
CERTIFICATE_FILEPATH	Text	This parameter can be used to specify the file path to your own certificate, which is used for communication between the components.
CERTIFICATE_PASSWORD	Text	If CERTIFICATE_FILEPATH is set, this parameter can be used to specify the password for your own certificate.
CERTIFICATE_SUBJECT	Text	If CERTIFICATE_FILEPATH is set, this parameter must be used to specify the

Parameter	Value	Description
		subject (or domain) of your own certificate.
EXISTING_CERTIFICATE_SUBJECT	Text	**Optional** If this variable is provided, the installation program attempts to find a valid certificate in the Windows certificate store (LocalComputer/Personal) whose CN (common name) corresponds to the provided variable. This certificate must contain a private key that is accessible in the store and is used for all TLS connections and other encryption and signing operations. This variable must not be used simultaneously with EXISTING_CERTIFICATE_THUMBPRINT or CERTIFICATE_FILEPATH.
EXISTING_CERTIFICATE_THUMBPRINT	Text	**Optional** If this variable is provided, the installation program attempts to find a valid certificate in the Windows certificate store (LocalComputer/Personal) whose thumbprint matches the provided variable. This certificate must have a private key that is accessible in the store and is used for all TLS connections and other encryption and signing operations. This variable cannot be used simultaneously with EXISTING_CERTIFICATE_SUBJECT or CERTIFICATE_FILEPATH.

3.6.8.3 Examples

Installation in English with log file:

```
WTS8setup.exe /qr DEFAULT_CULTURE="en-US" AC_USERNAME_PROP="admin"
AC_PASSWORD_PROP="admin" /L*V "%temp%\WTS8Silent.log"
WTS_SERVICE_PORT="7001" WTS_PORTAL_PORT="7011"
WTS_PORTAL_URL="https://localhost"
```

Installation in German with creation of the Testplayer icon on the desktop without using a password:

```
WTS8setup.exe /qr DEFAULT_CULTURE="de-DE" AC_USERNAME_PROP="admin"
NO_AC_PASSWORD="1" ICON_TP="1" WTS_SERVICE_PORT="7001"
WTS_PORTAL_PORT="https://localhost"
```

Installation with product key:

```
WTS8setup.exe /qr DEFAULT_CULTURE="de-DE" AC_USERNAME_PROP="admin"
AC_PASSWORD_PROP="Admin123" PRODUCT_KEY="xxx-xxx-xxx-xxx-xxx"
WTS_SERVICE_PORT="7001" WTS_PORTAL_PORT="7011"
WTS_PORTAL_URL="https://localhost"
```

Installation with your own certificate:

```
WTS8setup.exe /qn DEFAULT_CULTURE="en-US" AC_USERNAME_PROP="admin"
AC_PASSWORD_PROP="Admin123"
WTS_SERVICE_PORT="7001" WTS_PORTAL_PORT="https://localhost"
CERTIFICATE_FILEPATH="<path>\certificate.pfx"
CERTIFICATE_PASSWORD="MyCertPwd"
CERTIFICATE_SUBJECT="http://www.schuhfried.com"
```

3.6.8.4 Notes on use

- The parameters **AC_USERNAME_PROP**, **AC_PASSWORD_PROP** and **NO_AC_PASSWORD** are only required for initial installation. Any entries will be ignored during an update.
- The parameters **DB_SERVER_INSTANCE** and **DB_CATALOG_NAME** only need to be specified if a user-defined SQL server is to be used. If they are not specified, SQL Server Express is automatically installed and used as the database. If **DB_SERVER_INSTANCE** is specified, the installation of SQL Server Express as a prerequisite is automatically skipped.
- The parameters **SQL_SA_USER** and **SQL_SA_PASSWORD** only need to be specified if a user-defined SQL Server is used, but they are optional. If they are not specified, the database must have been created or updated before the setup is executed. The setup cannot create or update the database without sa users.
- If no dongle (hardware or software dongle) is found **and the parameter PRODUCT_KEY** is specified, an attempt is made to generate a software dongle. This requires an **internet connection**. If a dongle is available, any value specified after PRODUCT_KEY is ignored.
- Double quotation marks (") around the parameter values are only necessary if the value contains spaces (e.g., a path or file name).
- If a parameter is specified, **it must contain a value**. Empty values (e.g., AC_PASSWORD_PROP="" or AC_PASSWORD_PROP=) are not permitted and will result in incorrect processing.
- The parameter /exelang must be placed first, if specified. There must always be a space before the language ID (1031 or 1033). /exelang=1031 will not work.

3.6.8.5 Available languages

The following language codes can be used for the **DEFAULT_CULTURE** parameter.

Language	Language code
Chinese – Simplified	zh-CN
German	de-DE
English (USA)	en-US
French	fr-FR

Language	Language code
Italian	it-IT
Dutch	nl-NL
Polish	pl-PL
Portuguese	pt-PT
Hungarian	hu-HU
Rumanian	ro-RO
Russian	ru-RU
Swedish	sv-SE
Slovak	sk-SK
Slovenian	sl-SI
Spanish	es-ES
Czech	cs-CZ
Turkish	tr-TR

3.6.9 Authentication with OpenID Connect

In addition to the built-in accounts, **VTS Offline** supports user authentication through external identity providers that use the **OpenID Connect (OIDC)** protocol. Organizations using an OIDC-compliant identity provider can integrate it with VTS to enable **single sign-on (SSO)**. This allows users to authenticate with their existing **corporate credentials** managed by the external provider.

> The authentication via OpenID Connect is available from VTS version 8.30 and only in on-premises, VTS Offline installations.

3.6.9.1 Setup and configuration

To use an **OpenID Connect** identity provider, you need to update the **Identity Server** settings with the provider's configuration. The **Identity Server** is the component of VTS responsible for managing user authentication and handling all login requests.

After configuring the provider, create new users who will sign in through the external identity provider, and then you might disable the default **username and password** login option and only login with your provider.

3.6.9.1.1 1. Configure your OpenID Connect provider

To integrate with VTS, your **OpenID Connect (OIDC)** provider may require additional setup. This usually involves registering a new application with the provider. During this process, you will receive a unique **Client ID**, which is later used by VTS. You may also be asked to configure **redirect and logout URLs** to ensure proper communication between the OIDC provider and VTS.

The exact URLs you must configure depend on your VTS installation type — whether the system is configured to use **'localhost'** or a **fully qualified domain name (FQDN)** as the server address.

For both cases, you must define the **Redirect URI** (also referred to as the **Callback URL**) and the **Logout URLs** as shown below:

Redirect URI:
`https://[your_domain_or_localhost]:7016/signin-oidc`
Example: `https://localhost:7016/signin-oidc`

Logout URLs:
`https://[your_domain_or_localhost]:7016/signout-callback-oidc`
`https://[your_domain_or_localhost]:7016/signout-oidc`

These endpoints are used by VTS and the identity server to manage user sessions and ensure a seamless login and logout process through the configured OIDC provider.

3.6.9.1.2 2. Adapt the Identity Server settings file

The login method configuration is defined in the Identity Server settings file, typically located at: `%PROGRAMFILES%\SCHUHFRIED GmbH\Vienna Test System 8\Identity\appsettings.json`

Note: This is the default installation path. If the Vienna Test System was installed to a different location, the actual path may vary accordingly.

To configure the login method:

1. Open the `appsettings.json` file in a text editor. Text editor must run with the administrator rights in order to save the file.
2. Add the following configuration snippet on a new line directly after the first opening curly bracket ({).

```
"CustomOpenIdProvider": {
    "DisplayName": "enter desired display name here",
    "Authority": "enter url of your authority here",
    "ClientId": "123f1e4f-12b8-1234-bdcc-ef1234567b36",
    "Prompt": "select_account",
    "IsRegistrationEnabled": true,
    "ClaimMappings": {
      "idp": "idp",
      "oid": "oid",
      "email": "email",
      "name": "name",
      "preferred_username": "preferred_username",
      "alt_oids": "alt_oids",
      "given_name": "given_name",
      "family_name": "family_name",
      "/objectidentifier": "/objectidentifier",
      "/nameidentifier": "/nameidentifier",
      "emails": "emails",
      "emailaddress": "emailaddress",
      "/surname": "/surname",
      "/givenname": "/givenname",
      "sub": "sub",
      "tenantid": "tenantid"
    }
  },
  "LocalProvider": {
    "IsEnabled": true,
    "IsRegistrationEnabled": false
  },
```

3.6.9.1.2.1 2.1. Use credentials from your provider

In the configuration snippet, you'll need to add details about your **OpenID Connect provider**.
Enter the following information:

3.6.9.1.2.1.1 Display name

Set your preferred display name in the `DisplayName` field. This text appears on the login page so users can identify which login method they are using. The value must be in double quotes, for example:`"Sign in with your company account"`

3.6.9.1.2.1.2 Authority

Enter your provider's base URL in the `Authority` field. This is the main address of your OpenID Connect (OIDC) provider and allows VTS to discover its configuration.

Examples:

- Microsoft Entra ID (Azure AD): `https://login.microsoftonline.com/{tenant}/v2.0`
    - Called Directory (tenant) ID in azure portal
- Okta: `https://{yourOktaDomain}/oauth2/default`
- Auth0: `https://{yourDomain}.auth0.com/`
- Google: `https://accounts.google.com`

You can verify the URL by opening `<authority>/.well-known/openid-configuration` in a browser — it should return a JSON document.

The value must be enclosed in double quotes, for example:`"https://login.microsoftonline.com/38a14f1a-05af-444b-a31f-db50fa2009ac/v2.0"`

3.6.9.1.2.1.3 Client ID

Enter your provider-issued client identifier in the `ClientId` field.

The value must be enclosed in double quotes, for example:`"60ba08e8-f906-4886-885c-fa0d03d3507c"`

3.6.9.1.2.2 Example of appsettings.json with the configuration added

appsettings.json

```
{
"CustomOpenIdProvider": {
    "DisplayName": "Sign in with Company account",
    "Authority": "https://login.microsoftonline.com/38a14f1a-05af-444b-
a31f-db50fa2009ac/v2.0",
    "ClientId": "60ba08e8-f906-4886-885c-fa0d03d3507c",
    "Prompt": "select_account",
    "IsRegistrationEnabled": true,
    "ClaimMappings": {
      "idp": "idp",
      "oid": "oid",
      "email": "email",
      "name": "name",
      "preferred_username": "preferred_username",
      "alt_oids": "alt_oids",
      "given_name": "given_name",
      "family_name": "family_name",
```

```
      "/objectidentifier": "/objectidentifier",
      "/nameidentifier": "/nameidentifier",
      "emails": "emails",
      "emailaddress": "emailaddress",
      "/surname": "/surname",
      "/givenname": "/givenname",
      "sub": "sub",
      "tenantid": "tenantid"
    }
  },
  "LocalProvider": {
    "IsEnabled": true,
    "IsRegistrationEnabled": true
  },

  "Logging": {
    "LogLevel": {
      "Default": "Information",
      "Microsoft": "Warning",
      "Microsoft.Hosting.Lifetime": "Information"
    }
  },
  "AppSettings": {
    "IsLocalSetup": "true",
    "ChangeToNoPasswordAllowed": "true",
    "LocalCertificateFileName": "",
    "LocalCertificatePwd": "",
    "PasswordExpirationEnabled": "false",
    //Will only be considered if PasswordExpirationEnabled = true
    "PasswordExpirationInDays": "90",
    "PasswordTokenExpirationInDays": "7",
    "PasswordExpirationShowWarningPeriodInDays": "7",
    "CertificateSearchKind": "FindBySubjectName",
    "CertificateSearchValue": "SchuhfriedSelfSignedCertificate",
      //allowed range is 6 - 30. If not specified or outside of range, 8
will be used as a fallback.
    "PasswordMinLength": 8
  },
  "ConnectionStrings": {
    "WtsEntities": "Server=localhost\\WTSNXEXPRESS;Initial
Catalog=wts;Persist Security
Info=False;MultipleActiveResultSets=False;Encrypt=True;TrustServerCertific
ate=True;Connection Timeout=30;" //EFC = EntityFrameworkCore
  },
  "AzureAd": {
    "Authority": "https://login.microsoftonline.com/common/v2.0",
    "ClientId": "NOT_NEEDED",
    "Prompt": "select_account"
  },
  "AzureAdB2C": {
    "Instance": "https://login.schuhfried.com",
    "ClientId": "NOT_NEEDED",
    "ClientSecret": "NOT_NEEDED",
    "Domain": "login.schuhfried.com",
    "SignedOutCallbackPath": "/signout/B2C_1_signupsignin",
    "SignUpSignInPolicyId": "B2C_1_signupsignin",
    "CallbackPath": "/signin-b2c",
    "RemoteSignOutPath": "/signout-b2c"
  },
  "AllowedHosts": "*",
  "Kestrel": {
    "EndpointDefaults": {
      "Protocols": "Http1"
    },
    "EndPoints": {
      "Http": {
```

```
        "Url": "http://localhost:7015"
      },
      "HttpsInlineCertStore": {
        "Url": "https://localhost:7016"
      }
    }
  },
  "SecureValueStore": {
    "Type": "Keypass"
  }
}
```

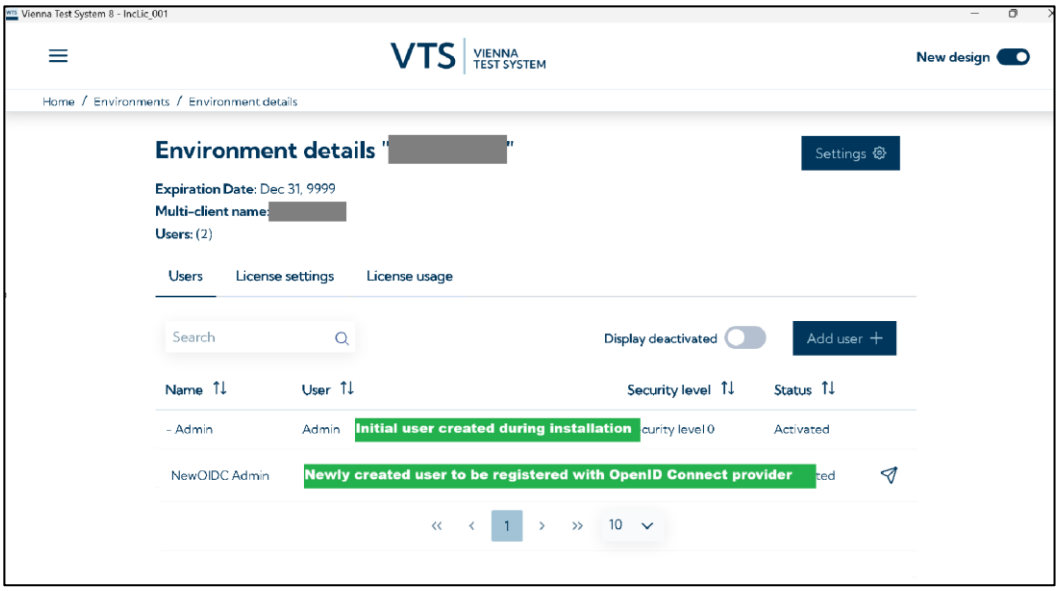
3.6.9.1.2.3 2.2. Restart WTS Service

⚠ After saving changes to the settings file, you must restart the Windows service “WTS Service” for the system to apply the updates and load the plugin with the new configuration. If you are unsure how to restart a Windows service, you may also reboot your machine instead.

3.6.9.1.3 3. Create first user

When the **OpenID Connect (OIDC)** provider has been configured and the **WTS service** has been restarted, launch the **Vienna Test System administration software**. The login screen will now display two available authentication methods: traditional **username and password login** and the **configured OIDC provider login**.

To enable access through the provider, log in first using the **administrator credentials** created during the system installation (or another admin account if you are performing an upgrade). From within the administration software, create a **new user** that will represent the administrator who authenticates via the external OIDC provider. For details see: [How to add users and limit their access].



Next, copy the **invitation link** for this user and open it in a browser. Complete the registration workflow — during this process, you will be prompted to sign in using your external identity provider account. After successful authentication, the new user in VTS will be **mapped to the external account**, establishing the link between the two identities.

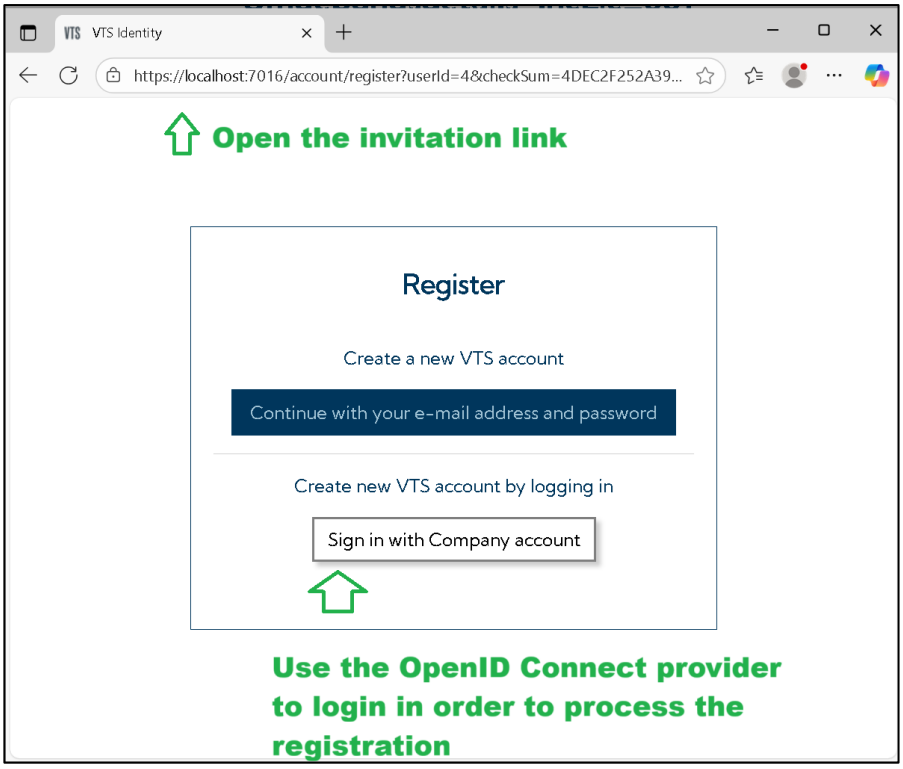


Figure 3 Open the invitation link in a browser window and select the newly configured OpenID Connect provider

Figure 4 After login to the OIDC provider is your VTS user connected and you can login to Vienna Test System

3.6.9.1.4 4. Migration of users

The system does not support automatic updating or migration of existing user accounts to **OpenID Connect (OIDC)** authentication. Each existing user must be manually replaced by creating a **new account** associated with the OIDC provider.

For every current user, create a corresponding new user and distribute the generated **invitation link**. Users should open the link in a browser and complete the registration process by signing in with their external **OIDC provider account**. During the first login, the system will **pair** the new VTS user with the external account.

After confirming that all users can access the **Vienna Test System Client** through the configured provider, the previously used (local) user accounts can be **removed** from the system.

3.6.9.1.5 5. Disable the login with username and password

Once the initial **administrator account** authenticated through the **OpenID Connect (OIDC)** provider has been created, you may disable local authentication to enforce provider-based logins only.

To disable it, open the **Identity Server configuration file** referenced in the previous setup step and locate the following configuration block:

```
"LocalProvider": {
  "IsEnabled": true,
  "IsRegistrationEnabled": false
},
```

Modify the `"IsEnabled"` parameter by setting its value from `true` to `false`.

After saving the changes, the **local username/password login** mechanism will be disabled, and only authentication through the configured **OIDC provider** will remain active.

3.6.9.1.5.1 Restart WTS Service

⚠ After saving changes to the settings file, you must restart the Windows service “WTS Service” for the system to apply the updates and load the plugin with the new configuration. If you are unsure how to restart a Windows service, you may also reboot your machine instead.

3.6.10 Update from older SQL Server versions

If your installation is based on a no longer supported version of Microsoft SQL Server, the VTS installer will display a corresponding message. In this case, installation is not possible without certain manual adaptations before running the VTS setup. Which version of Microsoft SQL Server is supported is stated on the page: System requirements.

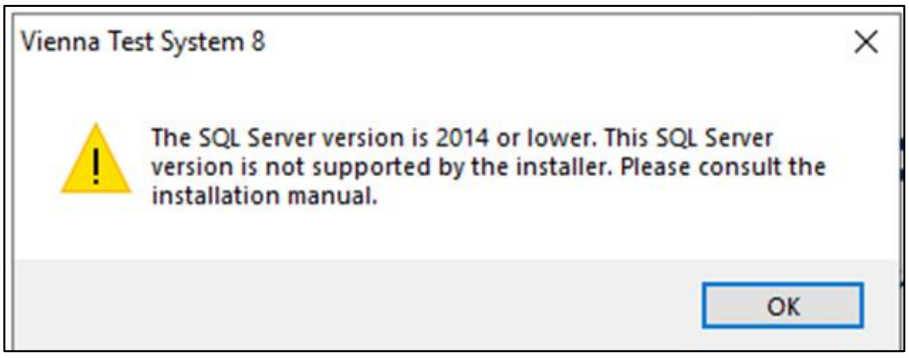


Figure 5 Example for the error message

3.6.10.1 Installation with a user-defined database

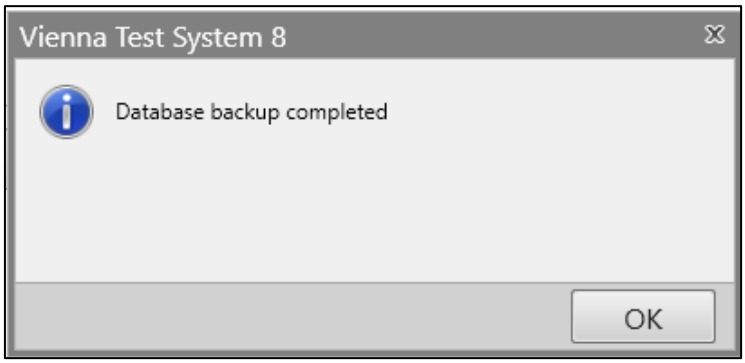
If you have installed your VTS server using scripts (see Manual installation of the VTS SQL database), you must first update your SQL server before updating the VTS database to the latest version. Follow the instructions here Manual update of the VTS SQL database.

3.6.10.2 Standard installation

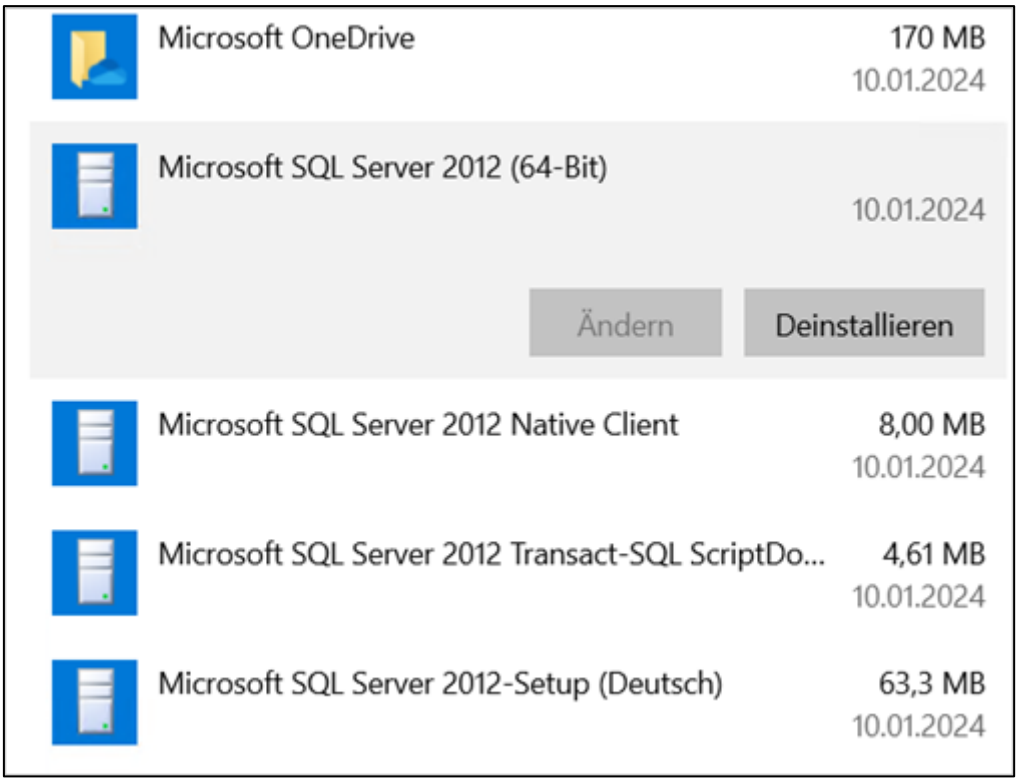
For a standard installation, please perform the following steps before starting the setup:

1. Open the VTS administration software.
2. Use the *Set backup path* button to specify a storage location for the database backup.
3. Go to *Settings* → *General settings* → *Database* → *Start backup* and start the database backup.
    a. The database backup may take some time. Depending on the size of your database and your hardware, the process may take several minutes or hours.

b. When the backup is complete, the following dialog box appears:

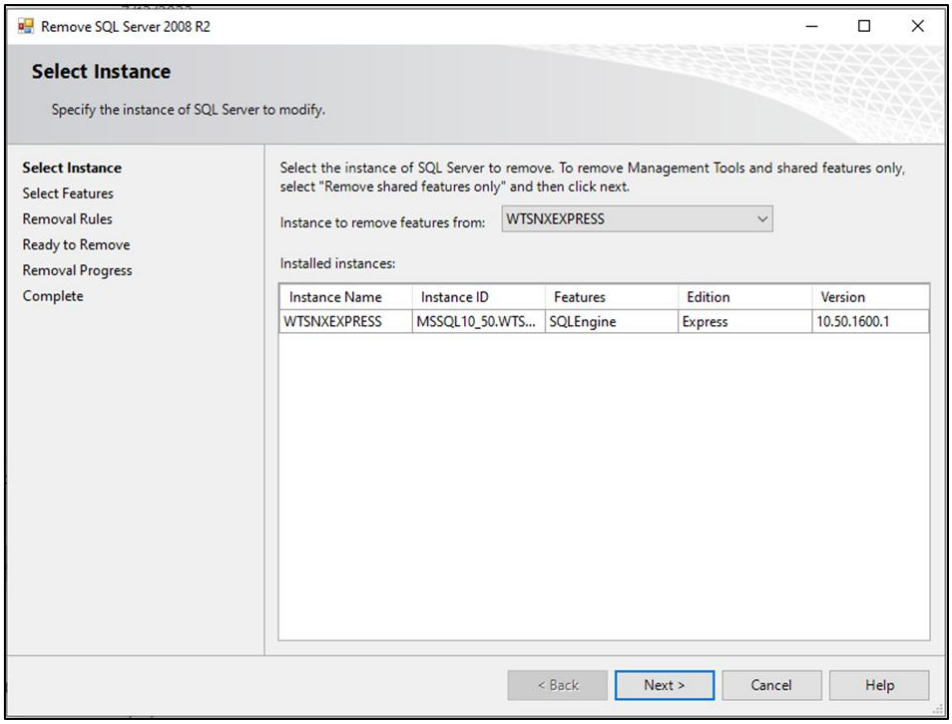


4. Close the VTS administration software.
5. Right-click on the taskbar and select *Task Manager* from the context menu.
6. When the Task Manager appears, go to *Services* → *WTS Service*.
   a. Right-click on *WTS Service* and select *Stop* from the context menu.
   b. Wait until the service has stopped.
7. Right-click on the *Start* button in Windows OS. A pop-up window will appear.
8. Click on *Installed Apps* in the context menu.
9. A Windows dialog box will appear showing all your installed apps.
10. Scroll to *Microsoft SQL Server*. There may be several apps installed that start with this name. Here is an example:

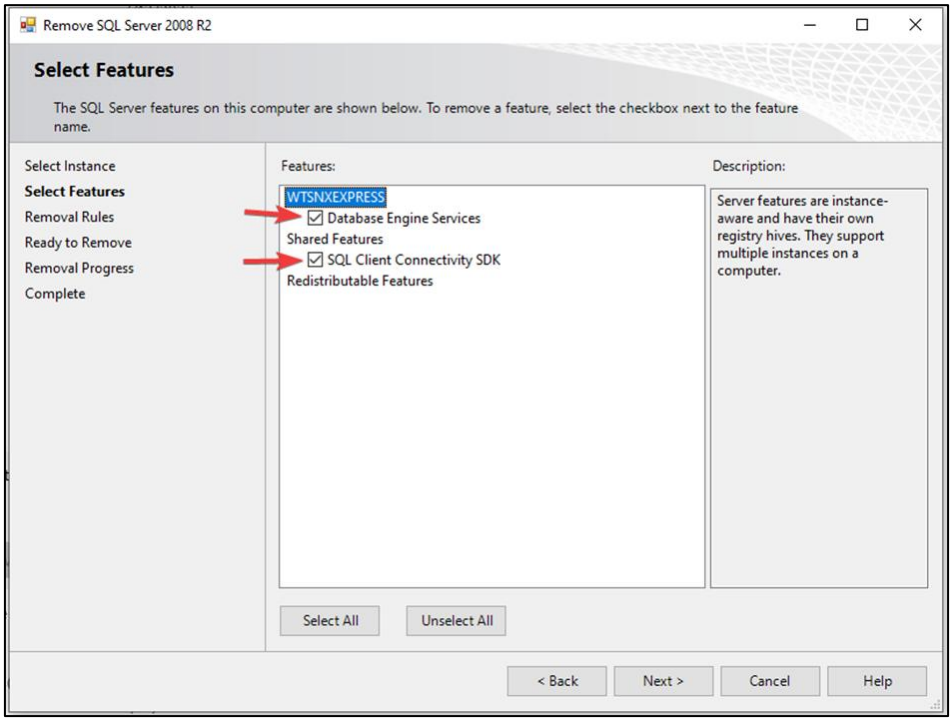


11. Uninstall the version that does not contain any words after the year, version, and description of whether it is a 32-bit or 64-bit version. (The version selected on the screen may differ depending on the version of SQL Server you are using.)
    a. Click the *Uninstall* button to uninstall SQL Server.
    b. The following (or a very similar) dialog will appear:

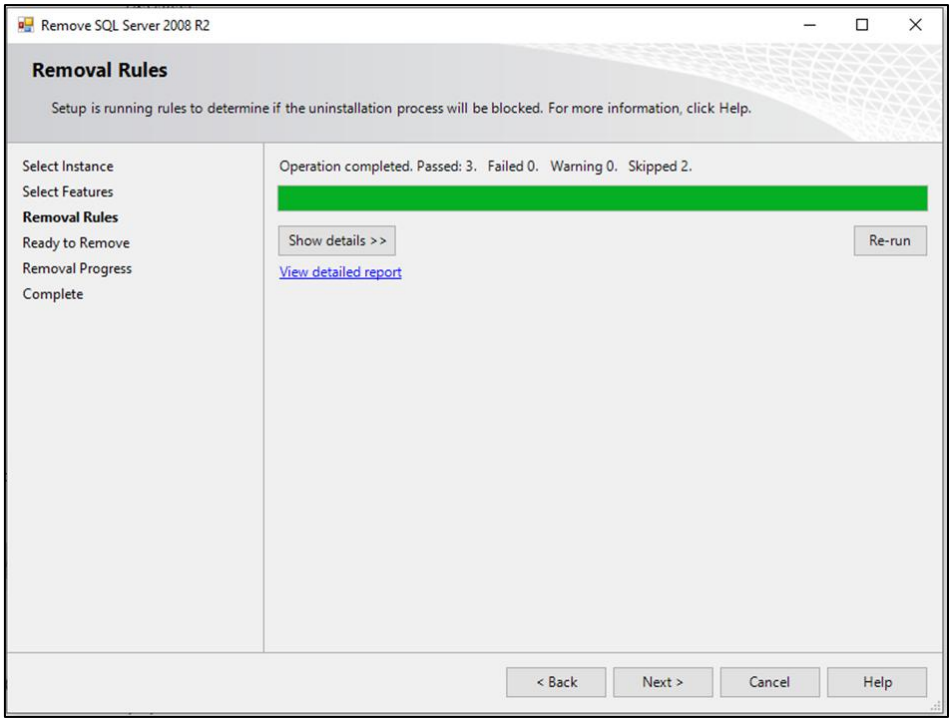
    c. Click the Remove link. Windows OS may prompt you to install additional features, such as .NET Framework 3.5. If this happens, simply click *Download* and install this feature.
    d. Depending on your SQL Server version, the SQL Server uninstall program will display the following (or a very similar) dialog:



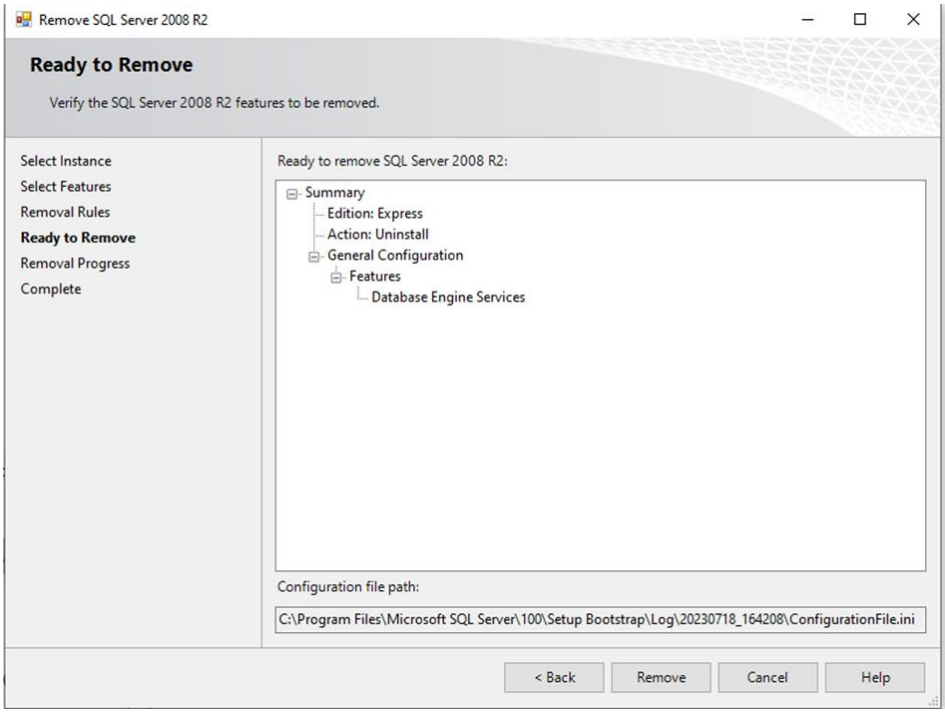
e. Click *Next*.



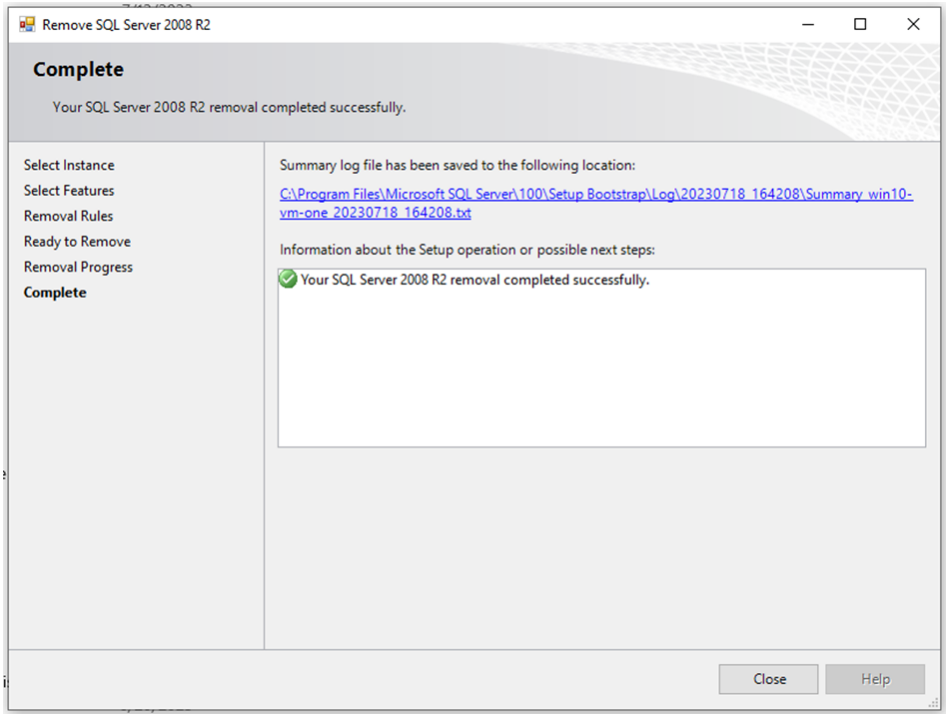
f. Select all check boxes and click *Next*.



g. Click *Next*.



h. Click *Remove* and wait for the deinstallation to complete.

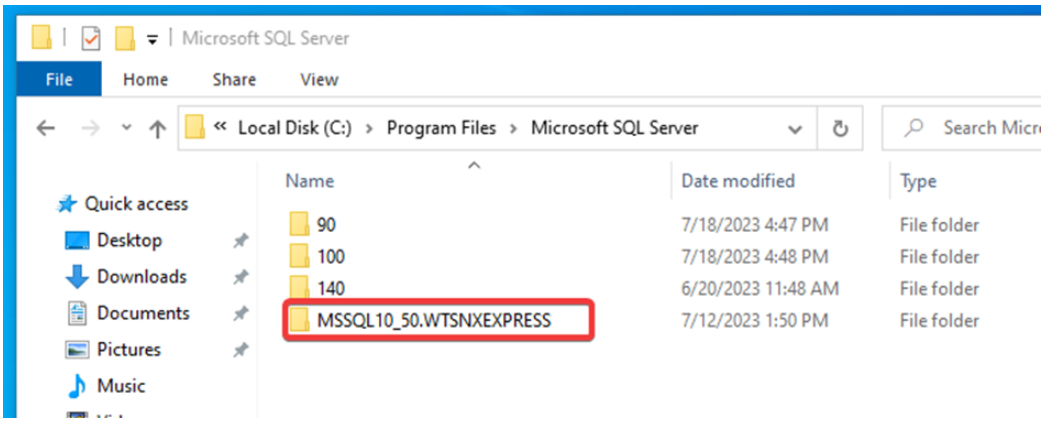


i. Click *Close*.

12. Restart your computer.

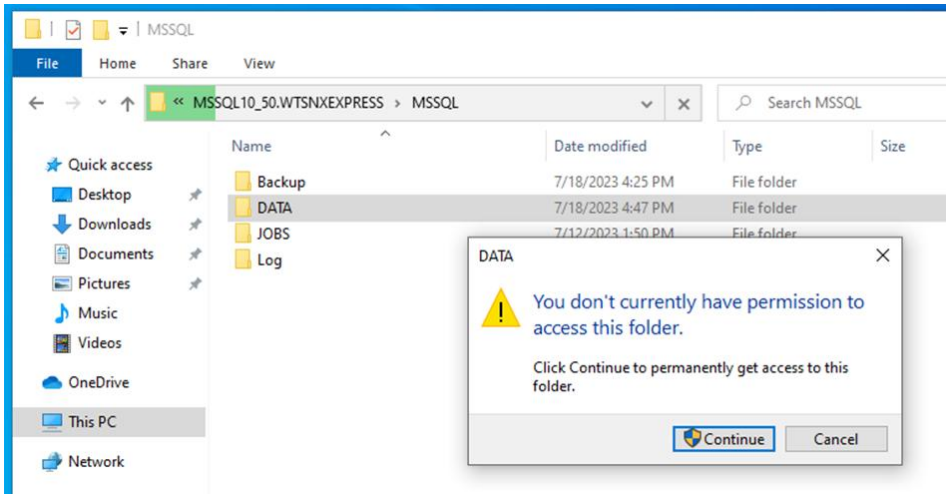
13. Open File Explorer and navigate to the C: drive and then to the path *C:\Program Files\Microsoft SQL Server*.

14. The name of one of the subfolders ends with `WTSNXEXPRESS`, e.g.:



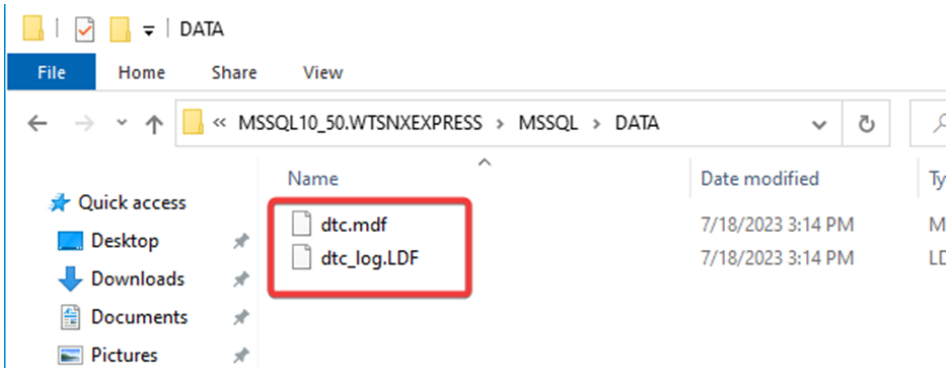
a. Go to this folder and then to the path of the subfolder MSSQL\Data.

b. Windows will ask for administrator rights.



c. Grant administrator rights by clicking on the *Continue* button.

d. You should now see two files named `dtc.mdf` and `dtc_log.LDF`:



e. Open another File Explorer window and enter the following path in the address bar: `%PROGRAMDATA%\schuhfried\sqldatabase`. Confirm with the Enter key.

f. Cut the files `dtc.mdf` and `dtc_log.LDF` from the `MSSQL\Data` folder and paste them into the folder `%PROGRAMDATA%\schuhfried\sqldatabase`.

15. Go to the folder containing the latest version of the VTS installer and start it again. It should install the newer version of Microsoft SQL Server while preserving your database files. If the installer does not run properly, please contact support.

3.6.11 Encrypted communication in VTS (https)

Communication between clients and servers is implemented in VTS 8 using the standardized Microsoft technology *Windows Communication Foundation* WCF. WCF offers several options for securing communication. The version used as standard in VTS ensures confidentiality, integrity, and authentication end-to-end between clients and servers (“message” security). This version is implemented at the application level and uses AES-256 for encryption (https://docs.microsoft.com/en-us/dotnet/framework/configure-apps/file-schema/wcf/message-of-wshttpbinding).

Additional information on WCF Security can be found here: https://docs.microsoft.com/en-us/dotnet/framework/wcf/feature-details/security-overview

The other APIs are hosted with the HTTPS protocol by default, using a self-signed, trusted SSL certificate.

By default, VTS always uses encrypted communication. The necessary certificates are generated automatically.

3.6.11.1 Using your own HTTPS certificate

To use your own HTTPS certificate, installation can be carried out via the command line: Silent installation via command line. Manual configuration afterwards is possible, but **not recommended**.

> Currently, only valid RSA certificates (2048-bit) can be used.

3.6.11.1.1 Installing the certificate via the command line

Starting with VTS version 8.26, the setup program also supports the installation of your own certificates, which are transferred via command line options. To do this, the installation command must be extended with the following parameters:

- EXISTING_CERTIFICATE_SUBJECT: Common Name (CN) of the certificate subject of a certificate stored in `LocalComputer/Personal windows certificate store`.
- EXISTING_CERTIFICATE_THUMBPRINT: Thumbprint of the certificate subject of a certificate stored in `LocalComputer/Personal windows certificate store`.

In both cases (provided that the installation program does not find any invalid certificates), the certificate must contain a private key with a length of at least 2048 bits.

The installation program configures the certificate and links it to the required ports.

For details on installation via command line, see: Silent installation via command line

3.6.11.1.2 Automatic certificate configuration with VTSCommand.exe

Since VTS version 8.27, you can automatically reconfigure the SSL/TLS/encryption/signing X509 certificate for all VTS components using the binary command line tool *VTSCommand.exe*. The command line tool can be found in the AdminClient subfolder of the VTS installation folder (Default: `%programfiles%\SCHUHFRIED GmbH\Vienna Test System 8 Client\AdminClient`).

The binary command line tool must be executed in a shell with extended rights or as an administrator. The tool can configure the X509 certificate for the entire VTS in two ways:

1. Use an existing certificate in the Windows certificate store of the local computer. To do this, execute the following command in Powershell: `.\VTSCommand.exe -c -k [X509-Certificate-Search-Type] -v [Certificate-Search-Term]`
   Where:
   a. `[X509-Certificate-Search-Type]`: Specifies the type of certificate search. The following values are allowed: `FindByThumbprint, FindBySubjectName, FindBySubjectDistinguishedName, FindByIssuerName, FindByIssuerDistinguishedName, FindBySerialNumber, FindByTimeValid, FindByTimeNotYetValid, FindByTimeExpired, FindByTemplateName, FindByApplicationPolicy, FindByCertificatePolicy, FindByExtension, FindByKeyUsage, FindBySubjectKeyIdentifier`
   b. `[Certificate-Search-Term]` specifies the content of the search. It depends on which `[X509-Certificate-Search-Type]` you used, e.g. for

`FindByThumbprint [Certificate-Search-Term]` is the thumbprint value of your certificate, e.g. " 993e3fcb87b355fb2a4d954abacbb33ba7f59865 ". For `FindBySubjectName [Certificate-Search-Term]` is the common name (CN) part of the certificate subject, e.g. *SchuhfriedSelfSignedCertificate*.

c. Examples:

i. `.\VTSCommand.exe -c -k FindByThumbprint -v 993e3fcb87b355fb2a4d954abacbb33ba7f59865`

ii. `.\VTSCommand.exe -c -k FindBySubjectName -v SchuhfriedSelfSignedCertificate`

2. Use a pfx file containing the exported certificate and its private key, as well as the password for opening the file (the certificate from the pfx file will be installed in the local Windows certificate store on your computer). The command is: `.\VTSCommand.exe -c -f [Pfx-Path] -q [Pfx-FilePassword]` Where:

a. `[Pfx-Path]` is the full path to your pfx file including the file name, e.g. `c:\users\admin\desktop\mycert.pfx`.

b. `[Pfx-FilePassword]` is the password required to read the pfx file

c. Example: `.\VTSCommand.exe -c -f c:\users\admin\desktop\mycert.pfx -q myCertPassword.1234`

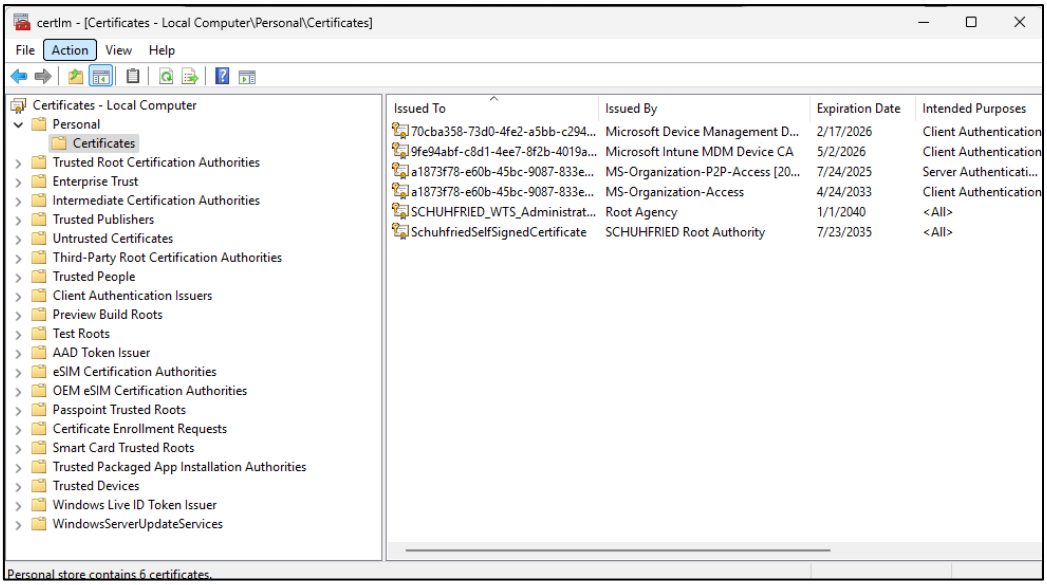
3.6.11.1.2.1 Notes

- You can also simply run the file .\VTSCommand.exe -c to enter all parameters interactively.
- You can use the -n parameter to remove yes/no questions. In this case, everything will be confirmed automatically.
- The tool updates the new certificate information in all necessary configuration files of the VTS.
- The tool backs up all configuration files in the folder *C:\ProgramData\Schuhfried\Backup* before changing them.
- During the execution of the tool, the VTS services such as the *WTS Service* or the *VIS (Universal Plugin)* are restarted.

3.6.11.1.3 Manual installation

In addition to the *WTS Service*, the VTS contains additional APIs that communicate using the HTTPS protocol. By default, the *WTS Service* and APIs encrypt their communication with a trusted, self-signed SSL certificate. However, it is possible to use your own SSL certificate issued for the hosted domain. To do so, the following steps are necessary:

1. Make sure that your certificate is stored under *Personal --> Certificates (Certificates - Local Computer)*.



2. Replace the default value (`SchuhfriedSelfSignedCertificate`) with the name of your own certificate.
    a. This must be done everywhere in the configuration file where the following key-value pairs are used: “`CertificateSearchValue`”: “`FindBySubjectName`” and “`CertificateSearchKind`”= “`your-certificate-CN`”.
3. Replace the default value with the name of your own certificate in the following configuration files:
    a. *Installation path*\Service\Service.Wcf\appsettings.json
    b. *Installation path*\Service\Service.Wcf\VTS.Service.Wcf.dll.config
    c. *Installation path*\Api\appsettings.json
    d. *Installation path*\Portal\appsettings.json
    e. *Installation path*\Testplayer.web\appsettings.json
    f. *Installation path*\\Identity\appsettings.json
    g. The *installation path* is by default: `%programfiles%\SCHUHFRIED GmbH\Vienna Test System 8`

    Example:

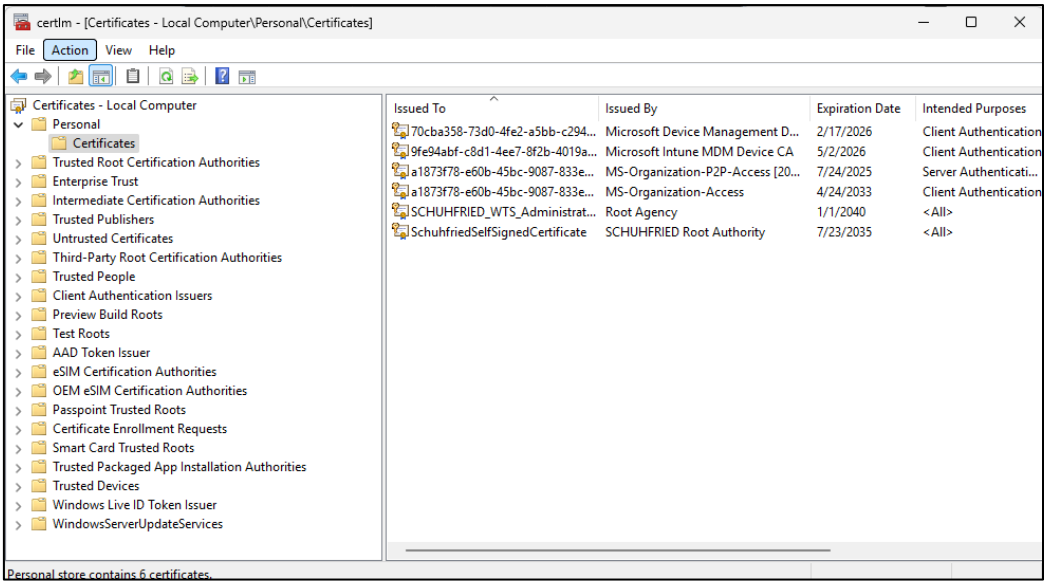
4. If changing the certificate applicant (subject) also changes the URL at which the VTS provides the service and APIs, the values in the *Client* table in the VTS database must be updated with the correct URL. The supplied SQL script `update_identityserverconfiguration.sql` can be used for this task after the correct URL has been added to the script. The script can be found in the *Scripts\Help* folder in the installation files.
5. Restart the *WTS Service*.

3.6.11.2 Configuring the VIS Universal Plugin to use an encrypted connection via HTTPS

The following steps describe how to configure the Universal Plugin to use HTTPS by using the self-signed certificate provided during setup or your own SSL certificate.

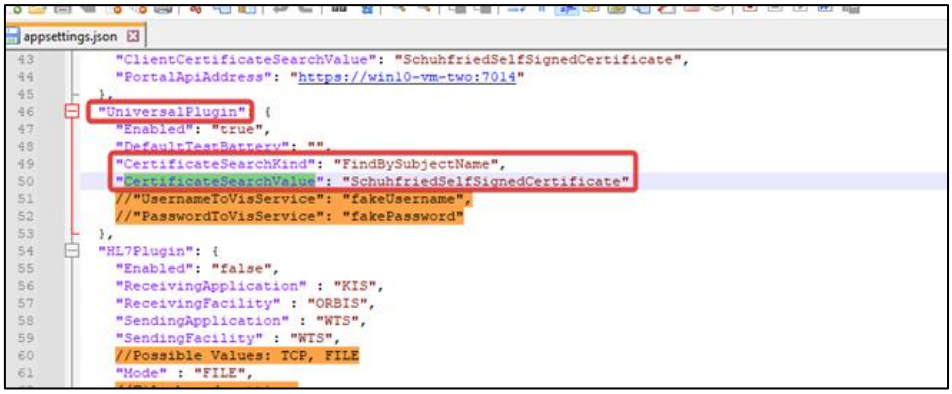
The following steps must be performed:

1. (Optional if you are using your own certificate) Make sure that your certificate is available under *Personal → Certificates (Certificates - Local Computer)*.



2. (Optional if you are using your own certificate) Enter the name (*subject*) of the certificate in the appsettings.json file in the *IntegrationService* folder in the installation folder (by default: `%programfiles%\SCHUHFRIED GmbH\Vienna Test System 8\IntegrationService\appsettings.json`).

    a. The change must be made in the *UniversalPlugin* section by adding the values for *CertificateSearchKind* and *CertificateSearchValue*:



3. Restart the *WTS Service*.

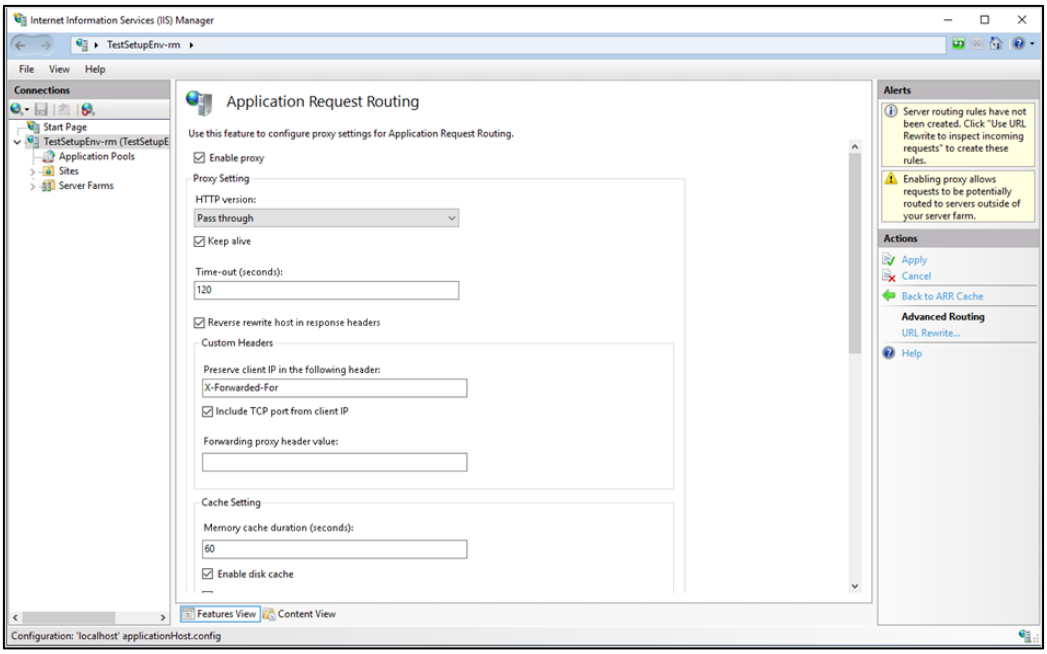
3.6.12 Setting up Testplayer Web with a reverse proxy via IIS

Testplayer Web is hosted in Kestrel. However, additional configuration options are sometimes required that Kestrel does not offer (e.g., port sharing). In this case, a reverse proxy can be configured using the Windows function *Internet Information Services* (IIS).

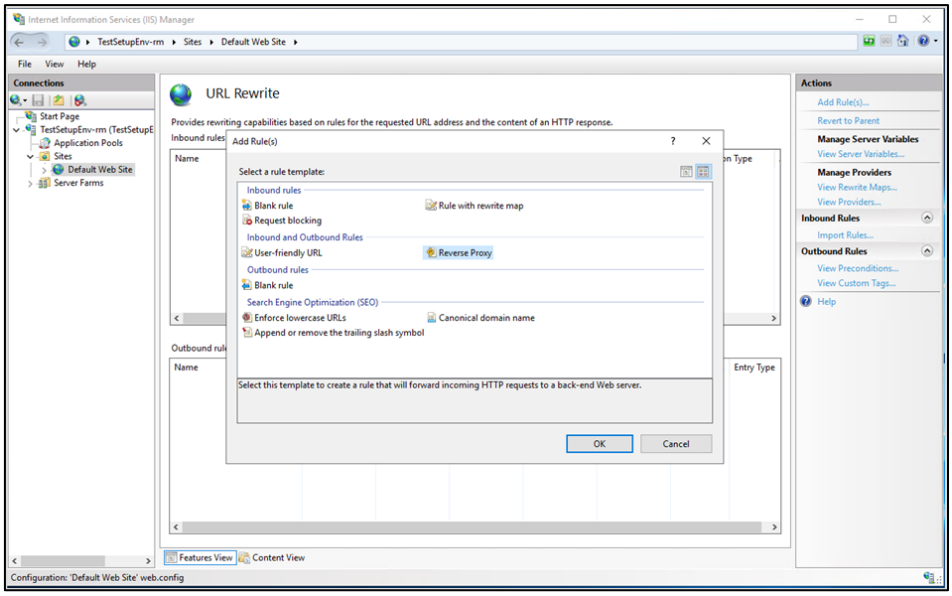
The following steps are required:

1. Download the IIS module *URL-Rewrite* and install it with the default settings (https://iis-umbraco.azurewebsites.net/downloads/microsoft/url-rewrite).
2. Download the IIS module *Application Request Routing* (ARR) and install it with the default settings (https://iis-umbraco.azurewebsites.net/downloads/microsoft/application-request-routing).

3. Start IIS and go to *Application Request Routing*. Then activate *Enable proxy* and click on *Apply.*



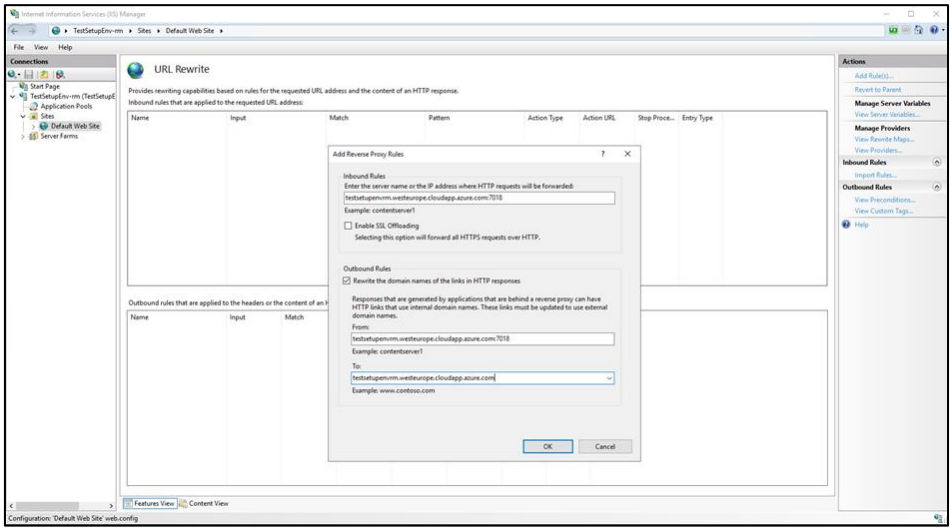
4. Go to a website (either a default website or create a new one) and click *URL Rewrite.*
   Note: In order for the reverse proxy to be configured correctly, **the added website must not contain a virtual directory.**
5. Configure a new reverse proxy rule.
   a. Add Rule(s)...
   b. Select *Reverse Proxy*.



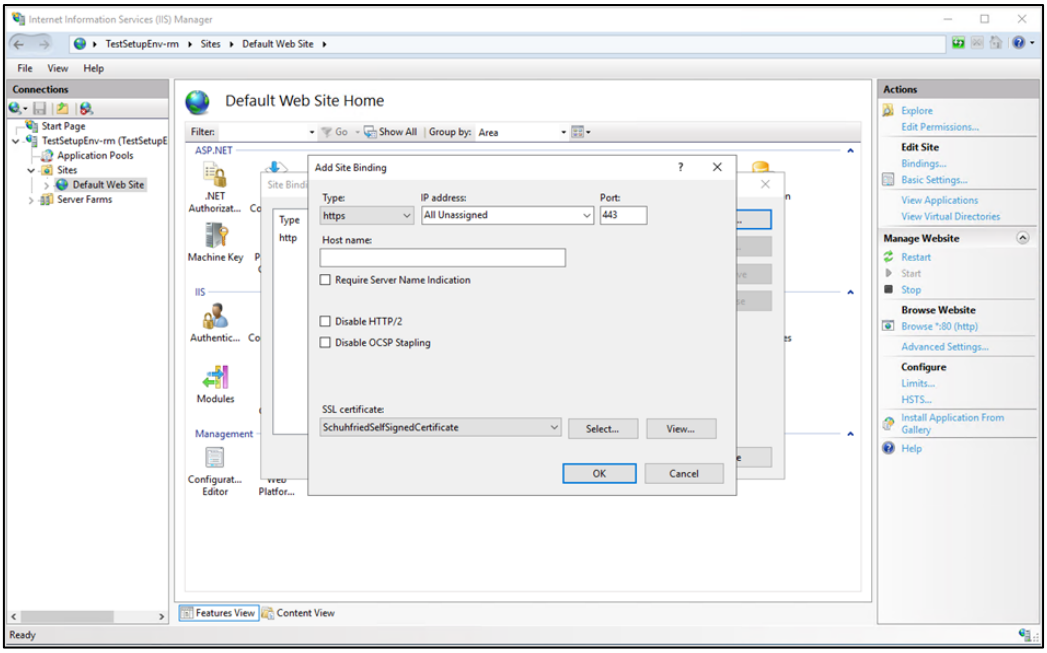
c. Under *Inbound Rules*, enter {domain}:7018, where *domain* is the domain under which Testplayer Web is hosted in Kestrel.

d. Disable *Enable SSL offloading.*

e. Enable *Rewrite domain names in HTTP responses* and set the domain under *To*. Click *OK*.



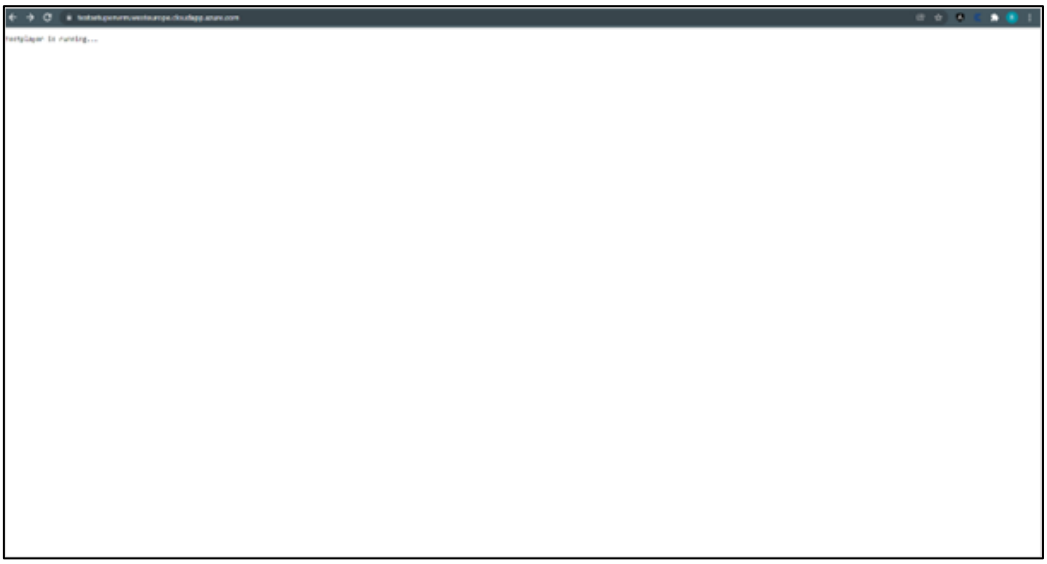
6. Right-click on the website, select *Edit Site Bindings*, and add a binding for HTTPS if it does not already exist. For *SSL Certificate*, you can select the certificate installed by the setup or use your own certificate issued for the configured domain. Click *OK*.



7. If Testplayer Web is not installed on the same computer where the IIS reverse proxy is configured, the *Response buffer threshold (KB)* (*Application Request Routing Cache -> Server Proxy Settings*) may need to be increased. You can see

this if a white page is displayed when running the test. We recommend increasing this value to 2048. However, depending on the test used, this value may be higher.

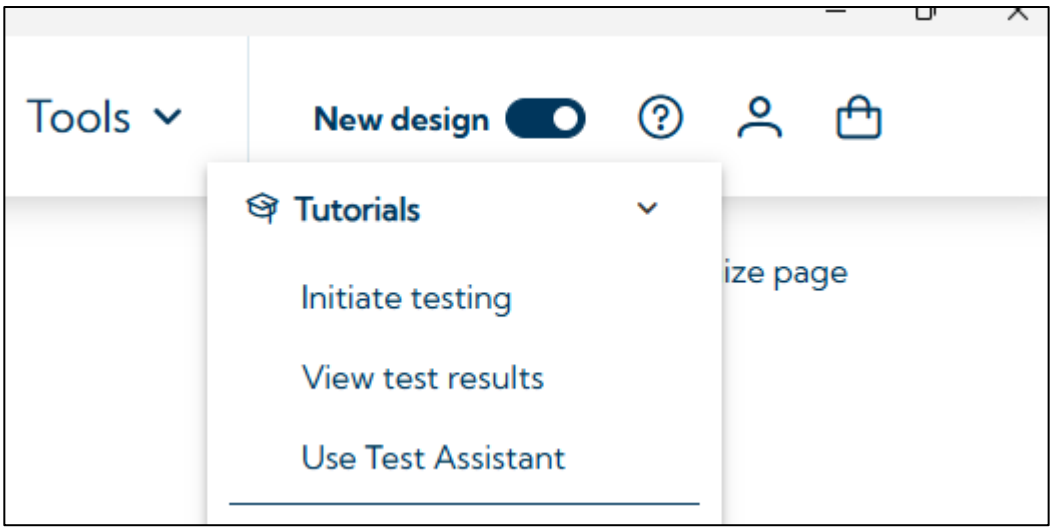
8. If everything has been configured correctly, you should see the following content when you navigate to the configured domain:



4 USAGE

4.1 Tutorials

The VTS offers interactive tutorials that explain the basic functions and how to use the system. You can find the tutorials under the following menu item:

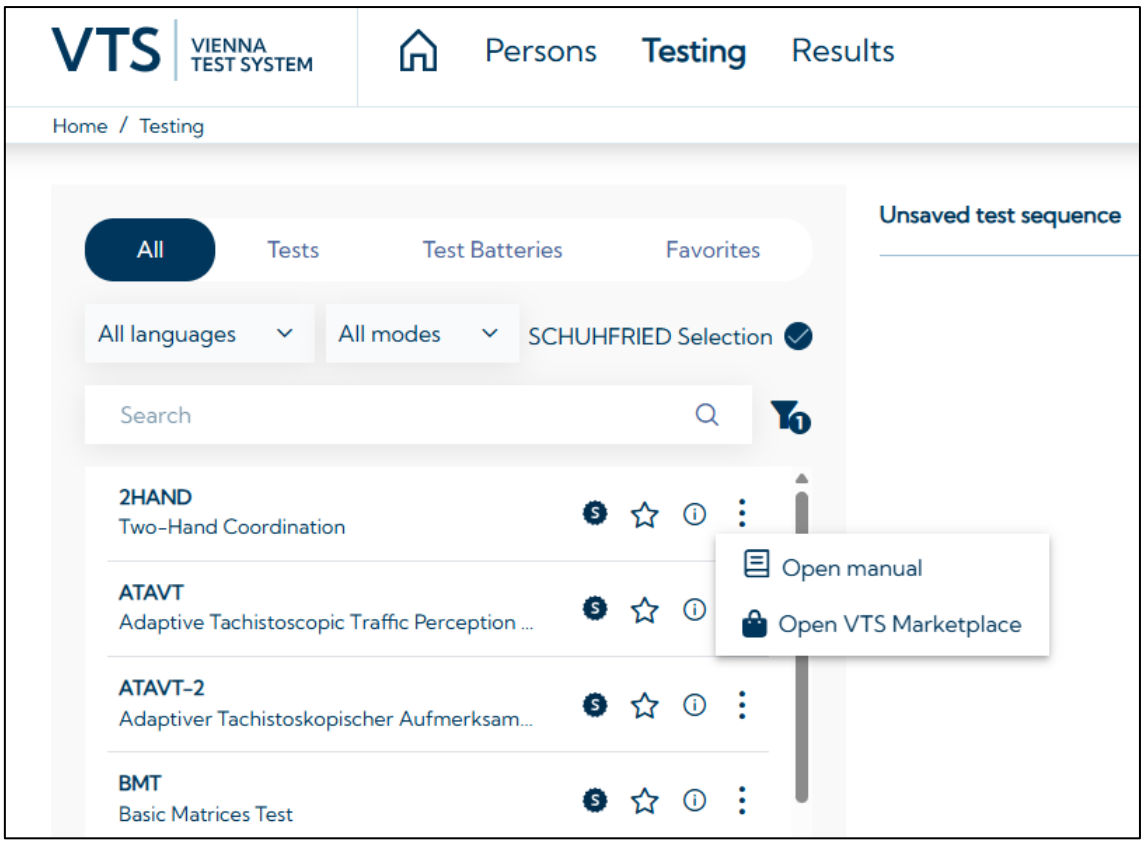


The tutorials can be started at any time and repeated as often as required.

4.2 Manuals

Information on the tests can be found in the manuals. You can access the manuals in the VTS using the corresponding option.

1. Go to the *Testing* tab→ Search for the test for which you want to open the manual.
2. Click on the icon with the three vertically arranged dots and select *Open manual.*



4.3 Testing

4.3.1 VTS - First Steps

These instructions provide a basic introduction to the Vienna Test System. They guide you through creating a new person, configuring testing, and viewing the test results.

More detailed information can be found on the corresponding pages.

4.3.1.1 Login

Go to https://vts.schuhfried.com or open your locally installed VTS on your desktop. Log in to your account by entering your email/username and password, or sign in with your Single Sign-On (SSO) of choice (e.g. Microsoft, Google, etc.).

4.3.1.2 From creating a test person to viewing the test results

4.3.1.2.1 Creating a Person

Click *Persons --> New person.* Then:

- Enter the personal data (fields marked with * are mandatory).
- Review the information, save it, and proceed manually to *Testing* or automatically with *Save and continue to selection of tests*.
- **Note:** You can also import multiple persons at the same time. (See Import Persons)

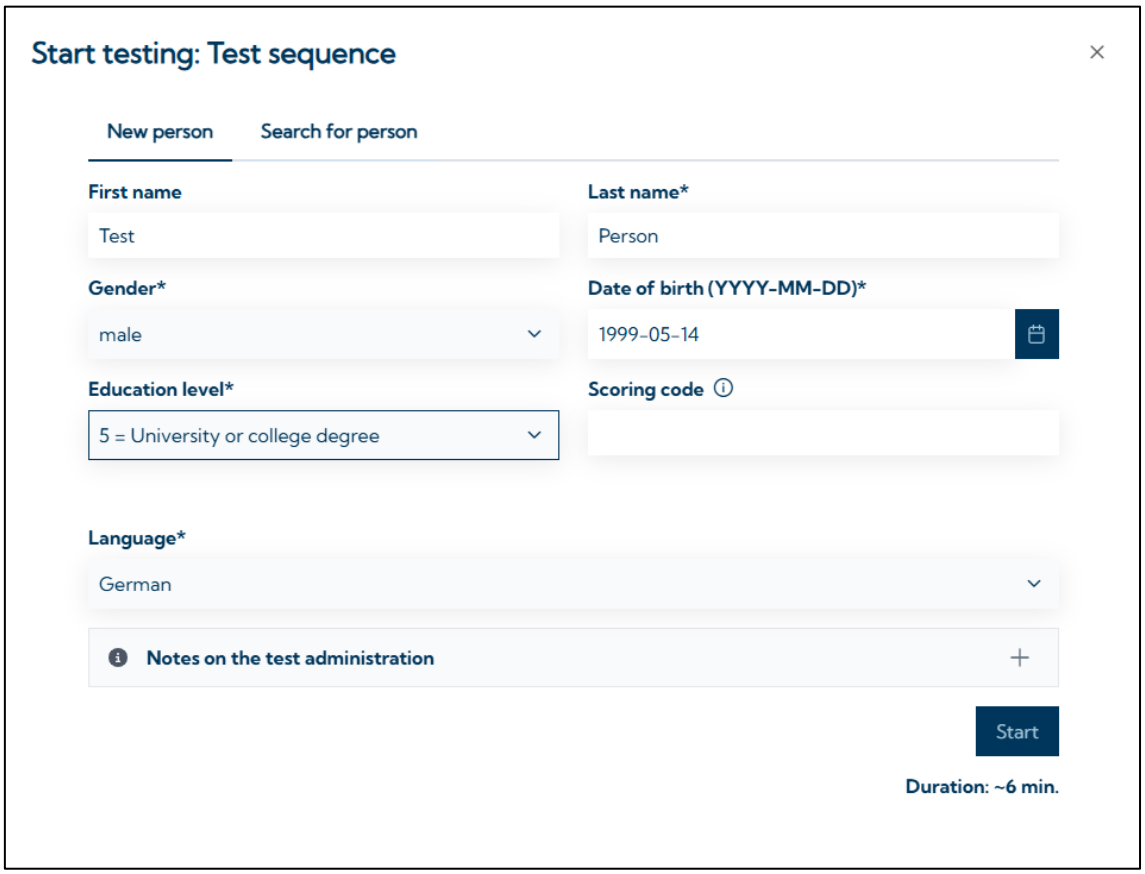
4.3.1.2.2 Starting a Testing

Under the *Testing* tab, available tests are shown on the left. The current test sequence appears on the right.

Note: You can filter tests and test batteries by language and testing mode.

Proceed as follows:

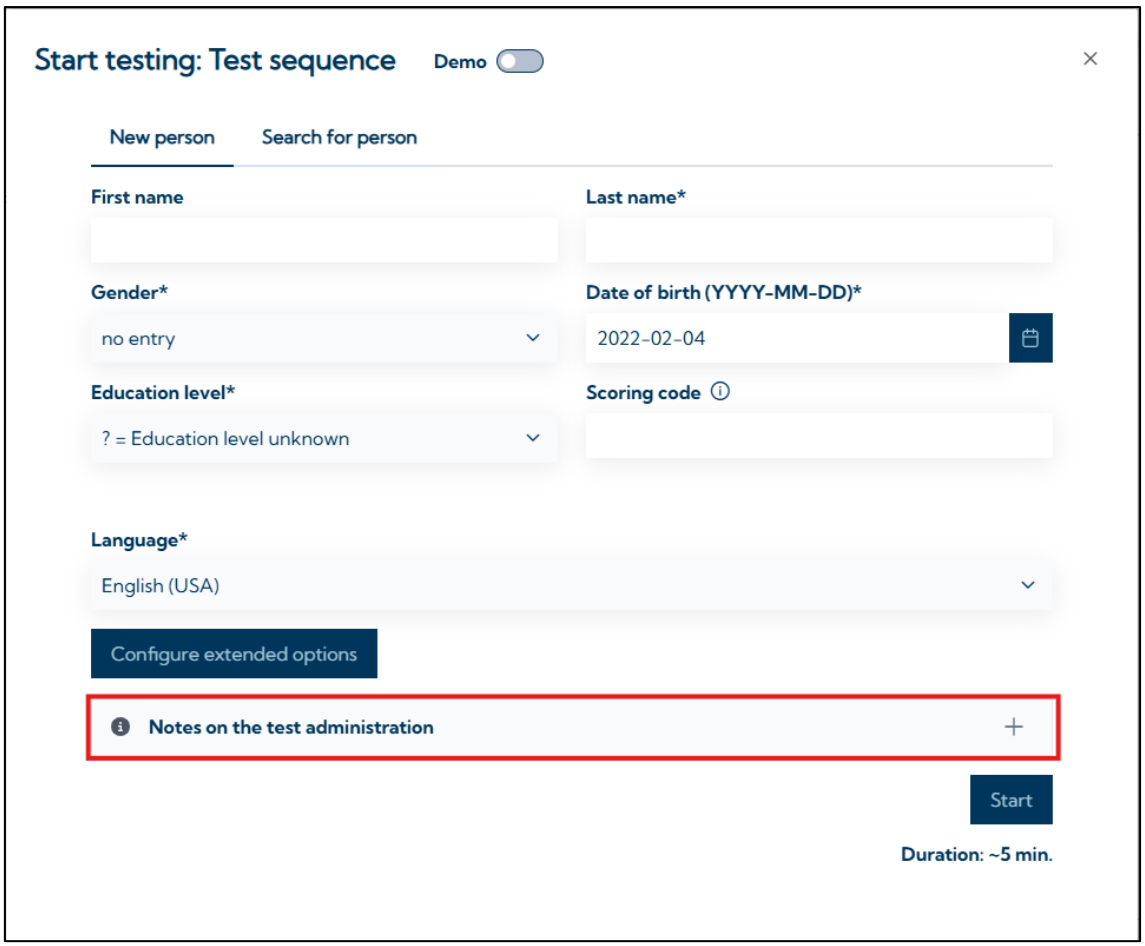
1. Select the tests you want to administer (drag & drop into the test sequence or select and click **Add**).
2. Choose the **Test Form**.
3. If applicable: *Configure* the test settings.
4. Start testing by clicking on *Start testing*, *Invite* or *Proctoring* depeding on your prefered **testing mode** (only modes supported by all tests in the sequence are selectable).
5. If applicable: Select a **person** to be tested and confirm the language.
6. Read the **notes on test administration**.
7. Click *Start* or *Send invitation* to begin the testing.



4.3.1.2.3 During the test

During the test you have options to intervene in or monitor the test:

- **Test administrator window:** For information on the test administrator window, please refer to the *Notes on the test administration* when starting a test.



- **Progress Monitor:** To access the *Progress Monitor,* Click *Tools* → *Progress Monitor.* Here you can see all active and inactive **ongoing** Testings. For more information, visit the Progress Monitor site.

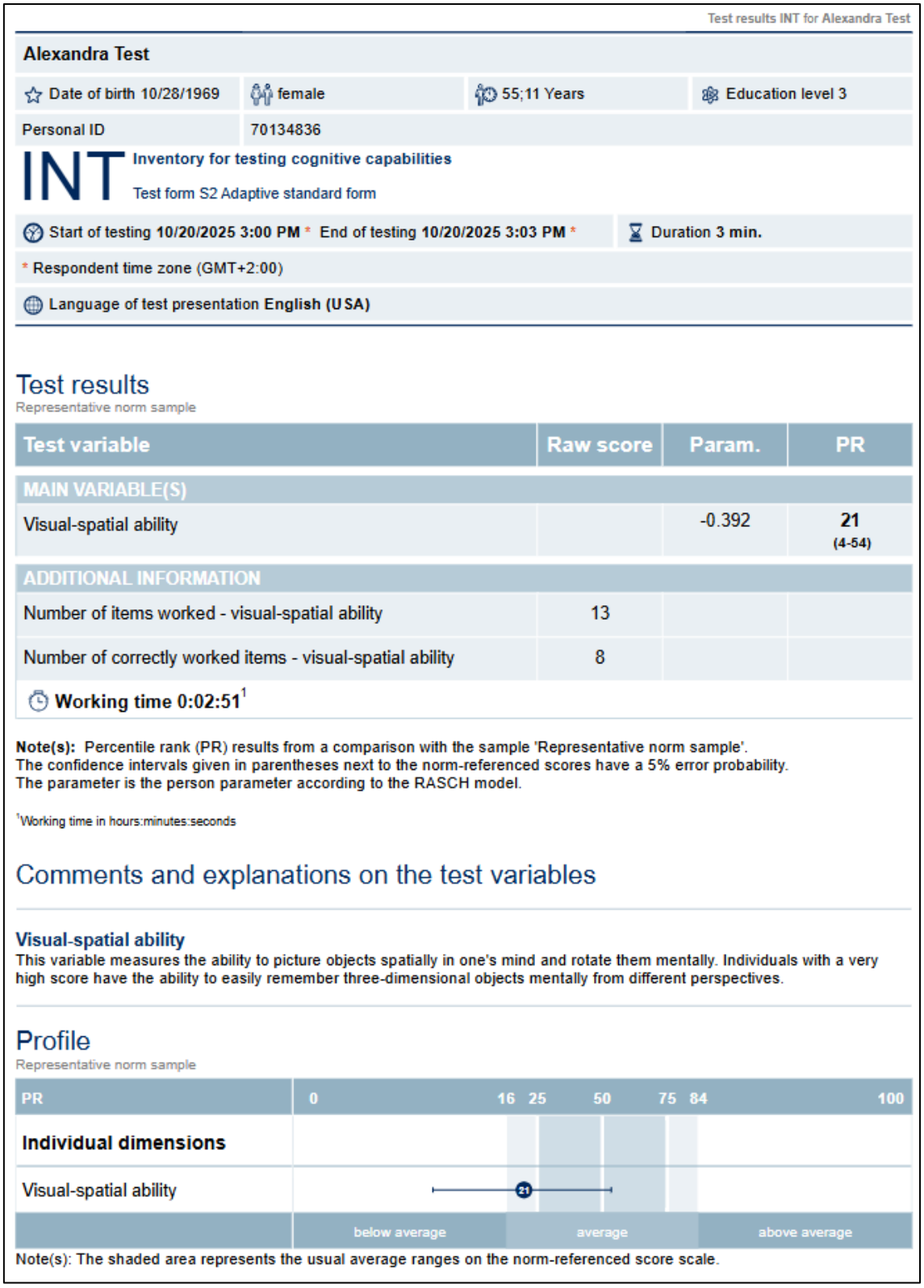
4.3.1.2.4 Viewing test results

After testing is completed, open the *Results* tab. A checkmark in the results table indicates that a test sequence has been completed and the results can be opened.

4.3.1.2.4.1 Individual scoring

To view a result, click the corresponding row. You will see:

- general information about the test person
- general information about the test session
- individual scoring results in the **test result table**
- a graphical **profile** of the results
- variable descriptions
- additional information about the test session



Test results INT for Alexandra Test

Alexandra Test

Date of birth 10/28/1969	female	55;11 Years	Education level 3
Personal ID	70134836		

INT **Inventory for testing cognitive capabilities**

Test form S2 Adaptive standard form

Start of testing **10/20/2025 3:00 PM** * End of testing **10/20/2025 3:03 PM** * Duration **3 min.**

* Respondent time zone (GMT+2:00)

Language of test presentation **English (USA)**

Test results

Representative norm sample

Test variable	Raw score	Param.	PR
MAIN VARIABLE(S)			
Visual-spatial ability		-0.392	**21** (4-54)
ADDITIONAL INFORMATION			
Number of items worked - visual-spatial ability	13		
Number of correctly worked items - visual-spatial ability	8		

Working time 0:02:51[1]

Note(s): Percentile rank (PR) results from a comparison with the sample 'Representative norm sample'.
The confidence intervals given in parentheses next to the norm-referenced scores have a 5% error probability.
The parameter is the person parameter according to the RASCH model.

[1]Working time in hours:minutes:seconds

Comments and explanations on the test variables

Visual-spatial ability
This variable measures the ability to picture objects spatially in one's mind and rotate them mentally. Individuals with a very high score have the ability to easily remember three-dimensional objects mentally from different perspectives.

Profile

Representative norm sample

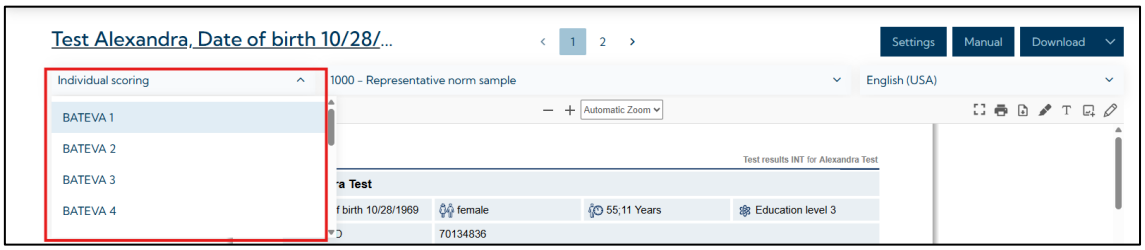
PR	0	16	25	50	75	84	100
Individual dimensions							
Visual-spatial ability			21				
	below average		average			above average	

Note(s): The shaded area represents the usual average ranges on the norm-referenced score scale.

You can also adjust the **norm sample**, **scoring language**, and other settings directly on the results page.

If you have selected multiple tests that a single test person has completed, or if you have selected test results from multiple test persons you can switch between them by using the navigation-bar on the top.

If you have a custom test battery evaluation (**BATEVA**), or if there's a predefines overall scoring (SFS Test Solution) you can also switch to the evaluation by using the drop-down on the top left side of the result view.

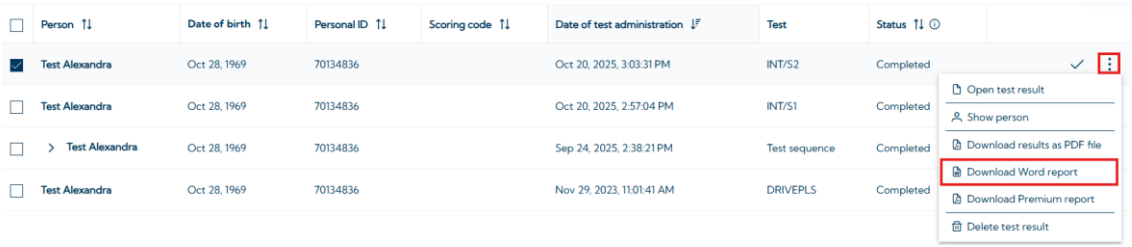


To open another result, return to the *Results* tab.

4.3.1.2.4.2 Word report

A Word report allows you to turn the numerical results of a test into clear, written text. The VTS lets you export these results into your own Word template, which you can create for individual tests or entire test batteries (**BATEVA**). This makes it possible to generate customized, text-based summaries that match your specific requirements, target groups, and corporate design. The report can include flexible text modules and optional graphics, giving you a personalized and easy-to-interpret presentation of the results.

You can download the Word report for a result by clicking "⋮" --> *Download Word report.*



4.3.2 Person management

Clicking the *Persons* tab opens the person management view.

Here, a list of all persons currently stored in the system is displayed, sorted by *Registration Date* by default. The list can also be sorted by any other column by clicking on the arrows ↑↓ next to the respective column header.

4.3.2.1 Create a new person

By clicking the button *New person*, a window with several fields to fill in opens. The person's last name, gender, date of birth, education level, and language are mandatory fields.

In the field *Department*, persons can be assigned to specific departments. This means that these persons and their results will not be visible to VTS users who have department filtering activated and are assigned to a different department (How to add users and limit their access).

The field *Scoring code* can be used to enter additional information about the person, such as occupation, diagnosis or reason for testing. The scoring code can later be used to filter different groups of persons in both the *Persons* and the *Results* tabs.

4.3.2.1.1 Direct Testing

If the person is going to complete their testing via Direct Testing, two additional fields are important:

Their respective test battery must be assigned in the field *Test battery for Direct Testing*.

In order to identify themselves and start the testing, the person must have a *Personal ID* number. This number can range from 1 to 2147483647 and must be unique within the VTS. If no number is entered by the administrator, it will be generated automatically.

Once all required information has been entered, the person can be saved and is then newly created in the system.

4.3.2.2 Import persons

By clicking on *Import*, persons can be imported using a .csv file. This option is especially useful in cases in which a large number of persons need to be created in the VTS.

Further information on data import can be found here: Import/Export of data

4.3.2.3 Filter options

In the search bar, specific persons can be searched for by entering their name or personal ID.

In addition, extended filter options are available by clicking on *Advanced filter*. Here, person groups can be filtered by scoring code and department.

4.3.2.4 Person-specific options

Persons can be selected by clicking on the checkbox ☐ next to their name. For the selected persons, several options are available:

By clicking on *To selection of tests*, you are transferred to the *Testing* tab, where the test sequence for the selected persons can be defined.

With *Edit*, the personal data of the selected person can be edited. If two or more persons are selected, only the *Test battery for Direct Testing* can be changed.

With *Print* it is possible to print the IDs or the full personal data for each person. With these options, the information for each person is printed on a separate page and can therefore be easily handed to the respective person, for example for Direct Testing.

With *Export*, the selected persons are exported in a .csv format. Further information on data import can be found here: Import/Export of data

Selected persons can also be deleted using the *Delete* button.

It is also possible to switch to a person's test results, edit their data, or delete the person by clicking on the three-dot symbol ⋮ at the right end of the respective row.

4.3.2.5 Display options for person list

The person list can be customized in several ways.

By default, 40 persons are displayed per page. This number can be changed to 10, 20, or 80 using the dropdown selection 40 .

Next to this, sensitive personal data can be hidden by clicking on the eye symbol .

Certain columns (e.g., name, gender) are displayed by default in the person list. However, additional columns can be selected from a wide range of available options by clicking on the slider symbol .

4.3.3 Results management

Under *Results,* test results can be centrally managed and viewed. Here, the results of all completed tests are listed.

4.3.3.1 Results page

4.3.3.1.1 Search and filter results

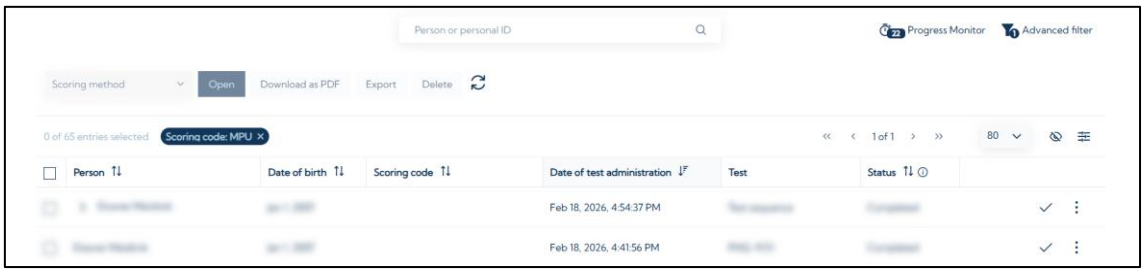
The search function allows targeted searching by the name of a test person or by the personal ID.

Additionally, an *Additional Filters* option is available. This allows restricting the displayed test results by:

- Date of administration (From - To)
- Scoring code
- Test sequence (test battery)
- Test

After clicking *Save* the selected filters are applied and only matching test results are displayed. Please note that the filter option *Evaluation code* is case-sensitive.

Active filters are displayed above the test results in a blue box and can be removed by clicking the *X* again. Afterwards, all results will be displayed again.



4.3.3.1.2 Table view of test results

On the right edge of the screen above the test results, the icon can be used to adjust which information is displayed in the table.

The icon allows personal data to be shown or hidden.

Only test results from **completed tests** are displayed in a list view. Ongoing or incomplete tests can be viewed via the *Progress Monitor*.

The listing of test results can be sorted using the icon ⇅ next to column headers. This allows, for example, an alphabetical listing or sorting by ascending/descending test date.

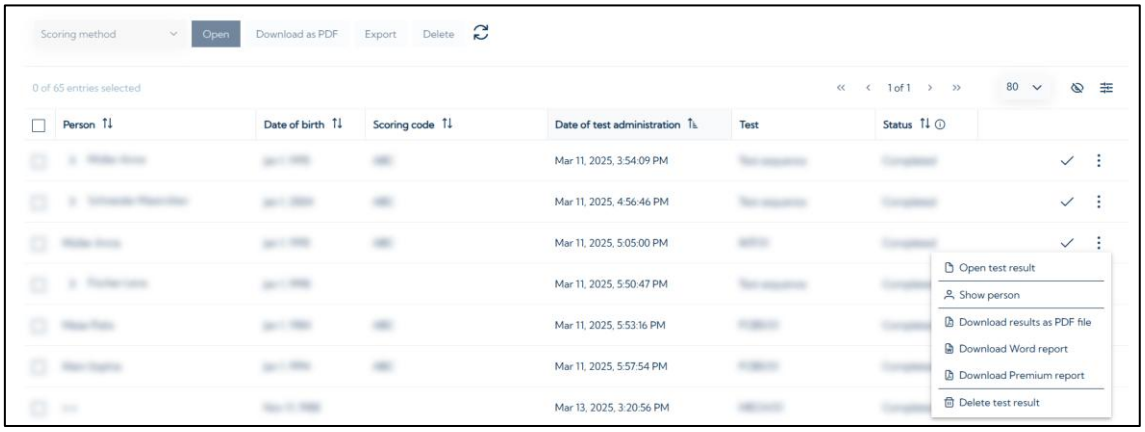
4.3.3.1.3 Actions for test results

By ticking one or more test results, they are selected. Clicking the box in the top row of the table also selects all displayed test results at once. Filtered-out test results will not be selected. After selecting the desired test results, the following actions are available:

- Select the scoring method (see details below)
- *Open* the test result
- Download the test result *as PDF*
- *Export* the test result
- *Delete* the test result

Multiple test results can be selected simultaneously. For more information on **result export** please see here.

By clicking on the **three dots** next to the checkmark, a dialog window opens with the following additional options:



If an invitation for a test was sent via email, this is indicated by ✉ in the row of the test result. When the mouse pointer is positioned over the element, the date of the test invitation is displayed as well as the email address to which the invitation was sent and the link through which the test was executed.

4.3.3.2 Scoring

The scoring shows the test results in detail. It contains information about the execution of the test (e.g., start, end, duration), information about the test person, as well as the test results. Below the general information about the test, a warning may be displayed if a criterion is met (e.g., the test was terminated prematurely).

The test results are presented in a table. In addition, the scoring may include other components such as:

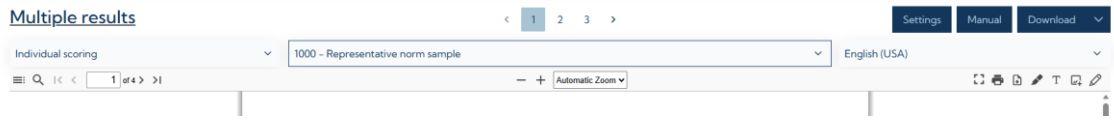
- Description of variables
- Profile
- Adaptive progress chart
- Test protocol

- Item analysis protocol
- ...

Which components are included depends on the respective test, the test paradigm, and the chosen evaluation method.

By clicking on the name of the test person, the personal data of the test person can be displayed.

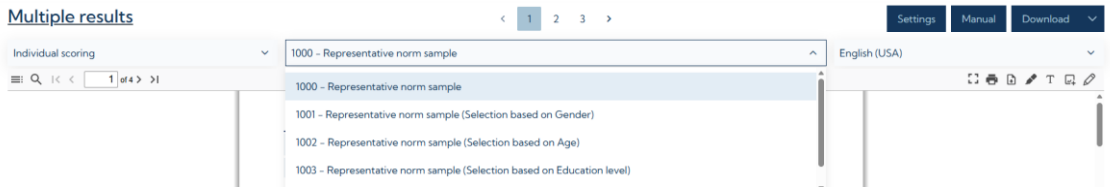
When multiple test results are selected simultaneously, you can switch between the pages.



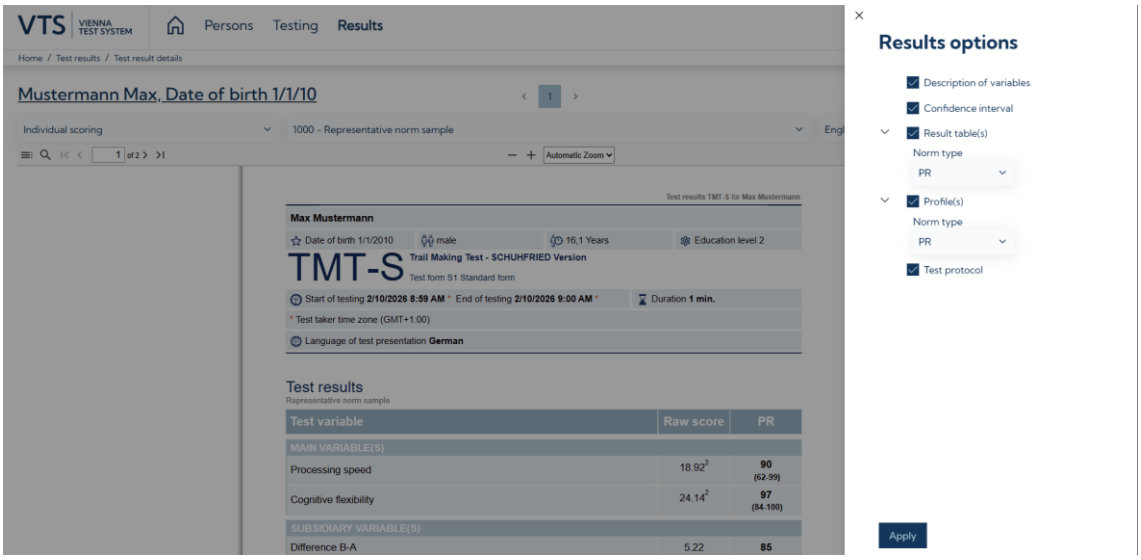
4.3.3.2.1 Settings in the scoring

Above the test results, the following settings can be made:

- Selection of the **scoring method**
- Selection of the **norm sample**, with which the test results are compared
- Selection of the scoring **language**



Via **Settings** at the top right of the screen, you can define which information is included in the scoring. Additionally, the **norm type** can be set here. By clicking *Apply* the settings for the scoring are applied.



The **test manual** can be opened via the *Manual* button. The scoring can be downloaded as a PDF file via *Download.*

4.3.3.2.2 Scoring Method

The scoring method determines which information is included in the scoring.

The **individual scoring** provides detailed information on main and secondary variables for each test and test form. Customized test battery scoring and **SFS Assessment scorings** allow the presentation of test results from various tests in a combined scoring. These can additionally include an overall rating

4.3.3.2.3 Additional options

4.3.3.2.3.1 Print options

The test results can also be printed directly from the VTS via .

4.3.3.2.3.2 Editing the scoring

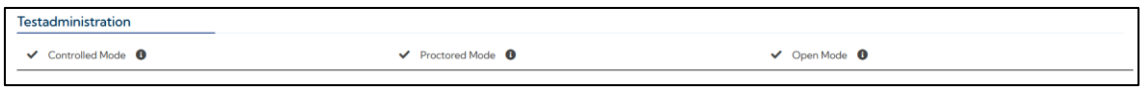
Additionally, the following editing options for the scoring are available via the respective icons:

- Switch to presentation mode
- *Highlighting* content
- Adding *text*
- *Adding or editing graphics*
- *Drawing*
- Via *Save* the scoring with the changes is downloaded.

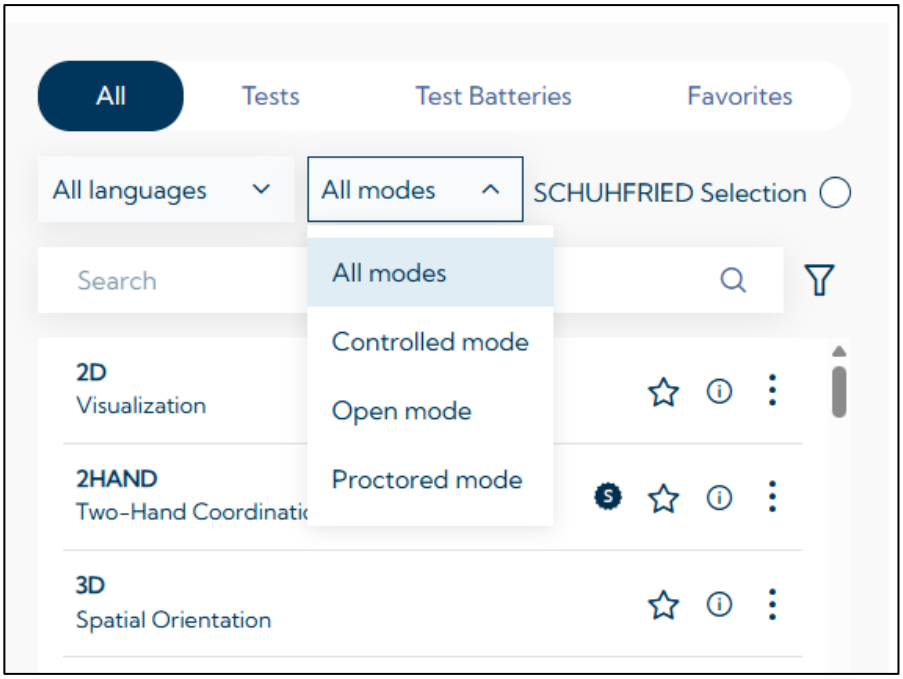
4.3.4 Testing modes

While traditional paper-and-pencil tests must necessarily be administered on site and under supervision (**controlled mode**), many digital tests also allow sending a test link so that the test person can complete the test location-independent unsupervised (**open mode**) or supervised online (**proctored mode**). In other words, different testing modes are available. The testing mode in which a test can be administered depends not only on the technology on which it is based, but also on other factors such as the current legal situation regarding assessments, the test design, or the consent of the test authors to use the test for certain testing modes.

The Marketplace shows which testing modes are supported for each test:



In the VTS, you can filter your licensed tests by the available modes on the *Testing* page:



4.3.4.1 Testing modes

As mentioned above, there are three different testing modes in the VTS: **controlled mode**, **proctored mode** and **open mode**. The order of the testing modes listed below also represents a hierarchy, arranged by test security and the degree of controlled administration conditions. All tests are available in controlled mode, i.e., the highest level of test security and control. Some of these tests can also be administered in proctored mode or even in proctored and open mode.

4.3.4.1.1 Controlled mode

Controlled mode refers to the **administration of a test on site and under the supervision of a trained test administrator**. This allows any questions or uncertainties on the part of the test person to be clarified quickly. This mode also offers the highest level of test security, as cheating can usually be ruled out. Tests that require peripheral devices such as a SCHUHFRIED Panel are only available in controlled mode.

In order to present a test in controlled mode you have to start a test on a PC manually (see How to test) or via Direct Testing by testing groups on-site.

4.3.4.1.2 Proctored mode

Proctored mode refers to the **location-independent supervised administration** of a test via a **test link**. This link is generated via the VTS and sent to the test administrator (proctor). Only once the online supervision is established, e.g., via a video conferencing tool, is the link handed over to the test person. Proctored mode combines the advantages of open and controlled mode (location-independent but supervised testing), but requires increased administrative effort, as appointments must be coordinated and technical infrastructure and a test administrator must be available for supervision. As with controlled mode, several people can be supervised simultaneously via proctoring if the technical facilities are available. This means that group testing (up to a certain number of people) is also possible in proctored mode.

4.3.4.1.3 Open mode

Open mode refers to the **location-independent unsupervised administration** of a test via a **test link** generated by the VTS and usually sent by email. Test persons are therefore free to decide how and when they want to take the test. For test administrators,

this means minimal administrative effort and maximum reach, but test security is lower and the conditions for taking a test can be recommended but not controlled.

4.3.4.1.4 Different modes for different test forms

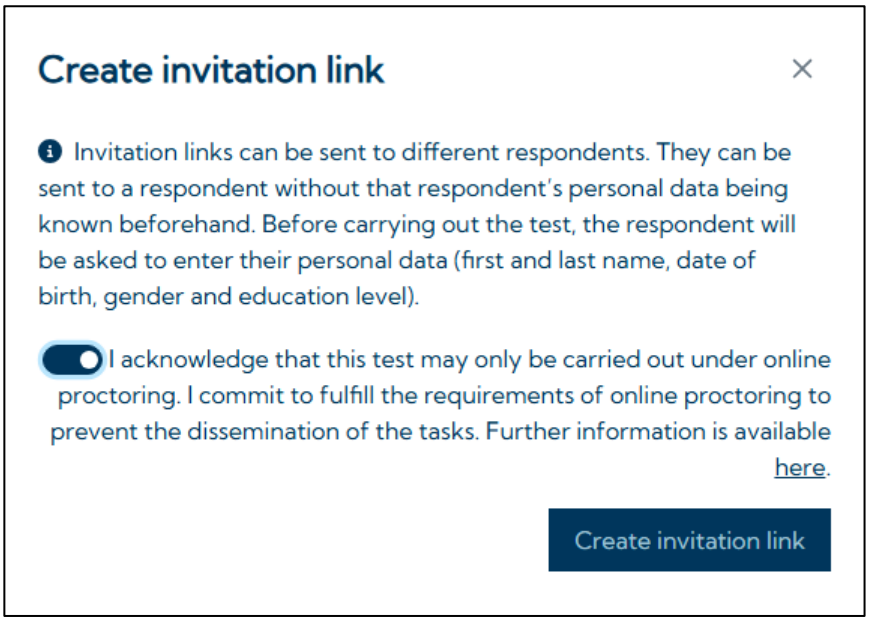
Some tests differ in their available test modes depending on their test form. For example, the INT cannot be started in open mode in the standard test form S1, but only in proctored mode or controlled mode. However, for the adaptive test form S2 of the INT open mode is available. The filter function can be used to search for the available test forms. However, please note that the setting in this filter also affects the test sequence and which options for starting a test are available.

4.3.5 Invitation links

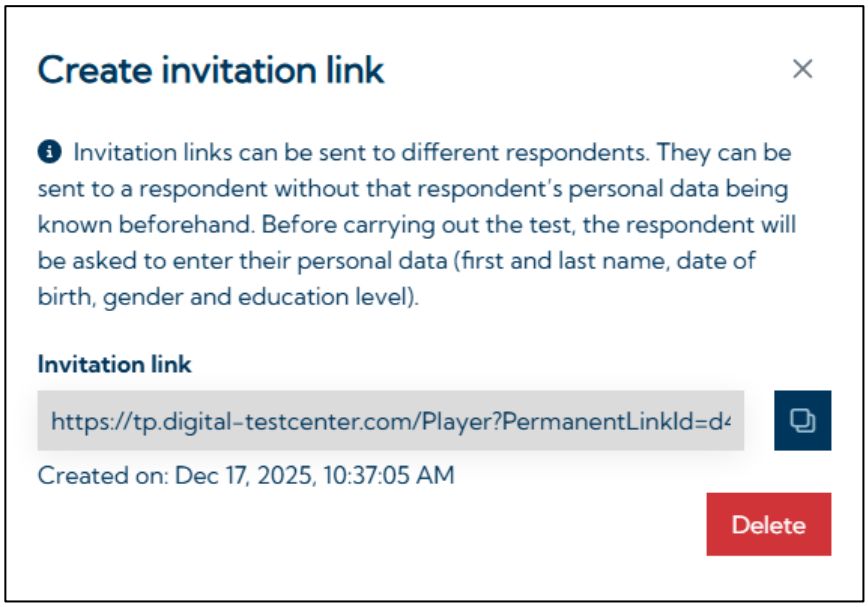
Invitation links are non-personalized links for conducting specific test batteries. By clicking on the link, test takers can independently create a new person in the system by entering their personal data (first and last name, date of birth, gender, and education level). The test battery connected to the invitation link then starts automatically.

> Invitation links can only be created if **every** test in the test battery is available in open or proctored mode (see Testing modes).

To create an invitation link, the test battery must first be created. Then, by clicking on the three-dot icon ⋮ and selecting the field *Invitation link*, the invitation link can be created, copied, and also accessed again later.



If the link needs to be deactivated, this can be done using the *Delete* button.



4.3.6 Group testing on-site

In group testing, several people are tested at the same time and under standardized conditions. In the Vienna Test System (VTS), the following options are available for conducting group testing on-site:

- Direct Testing
- Testing via invitation link

For both options, the PCs/laptops on which the individuals take the tests must be connected to the internet or a local network. This means that several locally installed systems without a connection to the internet or a local network cannot be used for group testing.

Below you will find an overview of the differences between the two options:

	Direct Testing	**Testing via Invitation link**
Input/Import of personal data	are entered or imported by the test adminstrator before the test session	are entered by each person directly at the start of the test battery
Type of tests	all tests	only tests that do not require a VTS Testplayer Client and are available in proctored or open mode
Requires personal data	For each person, the additional fields *Personal ID* and *Test battery for Direct Testing* must be filled in the personal data.	mandatory personal data are sufficient
Start of testing	By entering the *Personal ID* in the VTS Testplayer (Client)	by opening the invitation link and entering the personal data

4.3.6.1 Basic requirements for group testing

- Each test person has their own workstation with a PC/laptop.

- If a test requires specific hardware (e.g., SCHUHFRIED Panel), it must be available and ready for use at each workstation.
- If tests with auditory stimuli are used, we recommend the use of headsets so that test persons are not influenced by the sounds of others.

4.3.6.2 Direct Testing

With Direct Testing, the test is started by the test person entering their Personal ID in the VTS Testplayer (Client) and confirming their identity. The advantage of the Direct Testing option is that all tests from the VTS (i.e., also tests that require specific hardware) can be used. In addition, the test person only needs to confirm their personal data and does not have to enter them themselves. This avoids possible errors or incorrect entries in the person data collection.

Direct Testing is possible both with the VTS Testplayer Client and with the browser-based VTS Testplayer. The browser-based VTS Testplayer does not require installation and can optionally be used if the test battery only contains tests that are available in proctored or open mode.

4.3.6.2.1 Preparation for Direct Testing

- Create a test battery (even if the test battery contains only one test)
- Enter or import the personal data, including the fields *Test battery for Direct Testing* and, if applicable, *Personal ID*. If no personal ID is provided, VTS will automatically create one.
- At each workstation, either install the VTS Testplayer Client or start the browser-based VTS Testplayer (in VTS under *Applications*). The URL of the browser-based VTS Testplayer can also be saved as a favorite in the browser if necessary.
- If necessary, print personal key figures for each person (via the *Persons* area, selecting the persons and *Print --> Personal IDs*).

4.3.6.2.2 Administration of Direct Testing

- Hand over the personal IDs to the test persons
- Start the VTS Testplayer (Client)
- The test person enters their personal ID and confirms their identity
- The test battery starts
- The progress of the test can be monitored in the Progress Monitor
- Test results are available immediately after completion of each subtest

Figure 6 Enter personal ID

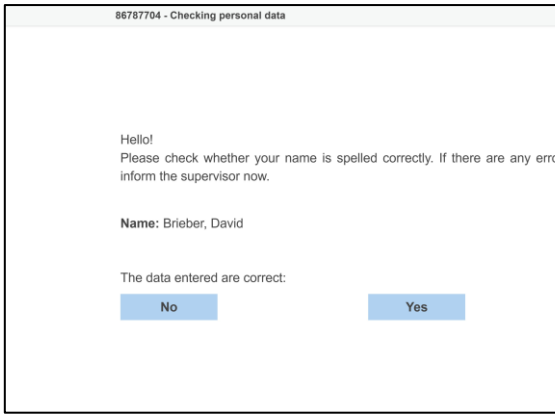


Figure 7 Identity verification (here via confirmation of name)

Under *Settings* --> *Testing*, you can also specify how identity verification should be carried out (confirmation of name and/or date of birth or entry of date of birth) and whether a person is allowed to repeat the test battery.

4.3.6.3 Testing via invitation link

When testing via invitation link, the test is started in the browser using a test link and by the test person independently entering their personal data. The advantage of this option is that preparation is simpler, as there is no need to install the VTS Testplayer or enter personal data in the VTS. However, as test persons have to enter their personal data themselves, incorrect entries in the personal data may occur.

4.3.6.3.1 Preparation for testing via invitation link

- Create and copy the invitation link for the test battery
- Open the test link in the browser at each workstation

4.3.6.3.2 Administration of testing via invitation link

- The test person independently enters the required personal data
- The test battery starts
- The progress of the test can be monitored in the Progress Monitor
- Test results are available immediately after completion of each subtest

4.3.7 Import/Export of data

The VTS provides import and export functionality for both personal data and test results data, enabling efficient data management and bulk processing. This allows users to easily transfer data into the system or extract existing data for further use or documentation.

4.3.7.1 Test persons

4.3.7.1.1 Import

In addition to creating individual test persons, test persons can also be imported via .csv file import. This option also allows multiple test persons to be imported at once.

4.3.7.1.1.1 Procedure:

1. Open the *Persons* tab.
2. Click *Import* to open the import dialog window.

3. Review the *Instructions* displayed in the dialog window, which describe the column names, allowed values, and required formats for the .csv file.
    a. The described fields correspond to the information that can be specified when creating a test person in the VTS.
    b. As with creating a test person in the VTS, only mandatory fields must be filled in.
4. (Optional) Click *Download example* to obtain a .csv file with predefined column names.
5. Create or edit the .csv file according to the specified format.
    a. All person data specified in the .csv file will be imported.
6. Configure the *Import settings* in the dialog window:
    a. Specify whether persons already stored in the database should also be imported.
    b. Select the required date format.
    c. Define the column delimiter used in the .csv file.
7. Click *Select file* to open the file explorer.
8. In the file explorer, select one or multiple .csv files for import.
9. Click *Verify and import* to validate the selected files before importing and to verify which test persons will be imported.
10. Click *Import* to start the import process.
11. After completion, the imported test persons, including all imported personal data, are displayed in the *Persons* tab.

4.3.7.1.2 Export:

Test persons can also be exported in .csv file format. It is also possible to export multiple test persons at the same time. During export, test persons are exported with all associated personal data.

4.3.7.1.2.1 Procedure:

1. Open the *Persons* tab.
2. Select the test persons you want to export.
3. Click *Export* to open the export dialog window.
4. In the dialog window, click *Export* to start the export process.
5. The selected test persons are exported with **all associated person data**, corresponding to the information stored for test persons in the system.
6. A new browser tab opens automatically.
7. In the new tab, click *Download* to download the .csv file.
8. Save the file to the desired folder. The file may be automatically saved in the default Downloads folder. You can then move it to any location you choose.
9. (Optional) Click *Task Monitor* in the export dialog window or click the *user icon* and select *Task Monitor*.
    a. In the Task Monitor, locate the export task, which is available for up to 14 days.

b. Click *View details* to open the download page.
c. On the download page, download the person export .csv file.
d. Save the file to the desired folder or move it from the Downloads folder if necessary.

4.3.7.2 Test results

4.3.7.2.1 Export

Test results can be exported in two formats: a VTS-compatible format (.xstp) and a .csv format.

VTS-format	CSV-format
Can be imported into any VTS	Cannot be imported into the VTS
Can only be viewed within the VTS	Can be opened in any text editor or spreadsheet program (e.g. Excel)
Contains all information related to the testing session	Contains all primary and secondary variables of tests. Desired comparison norm can be selected
Contains mandatory personal data of each test person	Contains mandatory personal data of each test person

4.3.7.2.1.1 Procedure

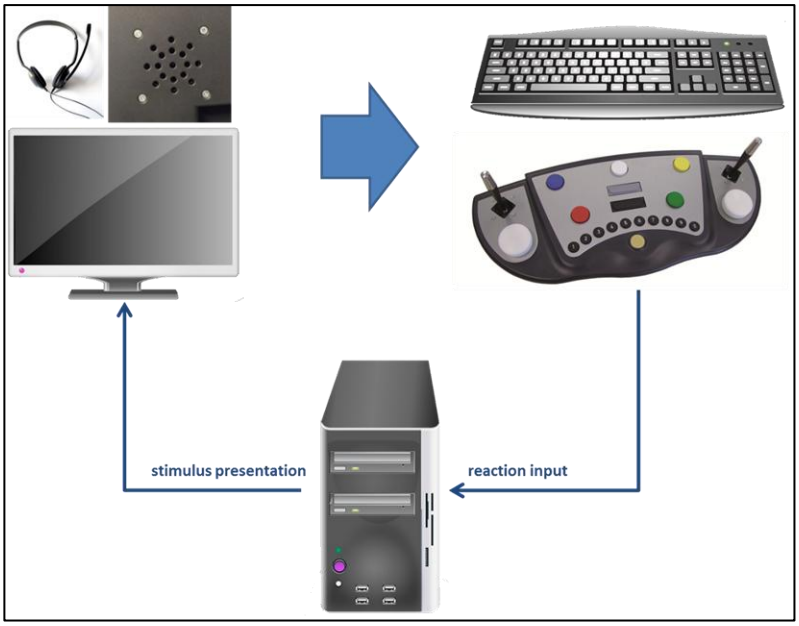
Test results can be exported via the *Results* tab.

1. Select the dataset you wish to export.
2. Click the *Export* button located at the top of the page. A pop-up window will appear.
3. Choose your preferred file format.
    - For CSV exports the desired comparison norm can be selected.
4. If needed, activate the checkbox to anonymize the data before export.
5. Confirm the export via clicking *Export*.
6. A new browser tab opens automatically.
7. In the new tab, click *Download* to download the file.
8. Save the file to the desired folder. The file may be automatically saved in the default Downloads folder. You can then move it to any location you choose.

4.3.8 Considering technical precision of measurement

The technical precision of measurement is of high importance in particular for tests that assess attention functions, reaction behavior and/or psychomotor functions. Even errors of measurement of only a few milliseconds can cause a significant shift of the normed test score and thus result in incorrect interpretation of the test results.

Measuring reaction times to the nearest millisecond is not straightforward. Many test programs or neuropsychological experiment generators quote reaction times in milliseconds in the test results but may nevertheless be affected by measurement errors of several times this amount, depending on the hardware and software used (see Häusler, Sommer & Chroust, 2007; Plant, Hammond & Turner, 2004). For this reason, special hardware components are developed for the time-critical tests of the Vienna Test System that can guarantee a measurement that is precise down to the millisecond and therefore down to the percentile ranks by way of **controlled input** and **output of stimuli.**



4.3.8.1 Stimulus presentation

4.3.8.1.1 Visual stimulus presentation

For tests with visual stimuli, the Vienna Test System outputs a signal to the monitor. A calibration module is available to compensate for the internal delay of the screen and the preparation and output of data. This module makes it possible to measure the exact screen delay. When performing a time-critical test for the first time, a query is posed automatically if calibration should be performed. The calibration can then be called up at any time via the Hardware Test function. The screen delay and possible delays in USB transfer from the panel determined in such a way will be used as the correction value for all successive time-critical tests. Calibrated test systems are guaranteed to yield measurements that can be converted accurately into milliseconds or percentile ranks regarding the stimulus output on CRT and LCD monitors.

If the tests are administered on an uncalibrated system using a panel, minor technical measurement errors of an average of between -2 and 8 milliseconds may occur (depending on the hardware and software used).

4.3.8.1.2 Acoustic stimulus output

In order to ensure the highest level of precision for auditory stimuli, it is recommended to use a standard audio output device. These are USB audio output devices and the audio output of the panel. If a non-standard headset or external loudspeakers are used for audio output, there is a risk that the driver software of these devices will produce measurement errors of up to 100 ms. In addition, these devices may have a different sound curve, so that - for example - low sounds may be reproduced more softly in comparison to other tones than was the case in the standardization of the respective time-critical tests.

If the audio output device used does not conform to the standard, this will be pointed out before the test session starts. A comment will also be included in the test results to the effect that the results were obtained under non-standard conditions.

4.3.8.2 Reaction input

An ergonomic SCHUHFRIED panel is available for input entry for time-critical tests. The panel also ensures fair test results for test takers with no computer experience and

guarantees to yield measurements that can be converted accurately into percentile ranks or milliseconds in combination with a calibrated screen or a standard audio output device.

For some time-critical tests, a PC keyboard can also be used for entering the response. However, when using a PC keyboard, greater errors of measurement and percentile rank shifts can be assumed. Internal measurement series with calibrated screens that included six different PC keyboard models resulted in an average deviation of around 25 milliseconds for an average of a minimum of 5 and a maximum of 50 milliseconds. Since PC keyboards always show a positive delay of reaction times, it can only be assumed that when achieving a certain test score that it would not have fallen short for an exact measurement. For example, assuming a percentile rank of over 25 with a PC keyboard, it can be assumed that the result would not have been below average for an exact measurement.

4.3.8.3 Practical effects on the normed test result

The effects of measurement errors on the norm-referenced scores depend on the **type of test** and the **position of the raw score**. For very simple **stimulus reaction tests,** the distribution of raw scores in the norm sample is usually insignificant, so measurement errors can result in greater distortion in the normed test results. In addition, deviations are caused by measurement errors due to the distribution of the norm sample and are usually greater than for **average performances** than for above or below-average performances.

The test RT can be taken as an example to illustrate this:

Raw score without measurement	Raw score without measurement	Raw score without measurement	Raw score without measurement
382	10	407	6
287	50	315	33
194	100	219	96

This indicates that inaccuracy in technical measurement in the medium range would result in a loss of 17 percentile ranks while the result in the upper and lower range would only be skewed by 4 percentile ranks.

4.3.9 Ergonomic requirements for the workstation

To enable standardized and comfortable testing with the VTS, the workstations used for testing should be ergonomically set up. This ensures that all test takers have the same conditions to perform at their best during testing.

4.3.9.1 Desk and chair

The table and seat height should be adjusted to suit each test taker and set up so that they can work in an upright position. The viewing angle of the screen should be approximately positioned at 30 degrees. The foot-operated keys and foot pedals must be positioned so they can be operated from a normal sitting position.

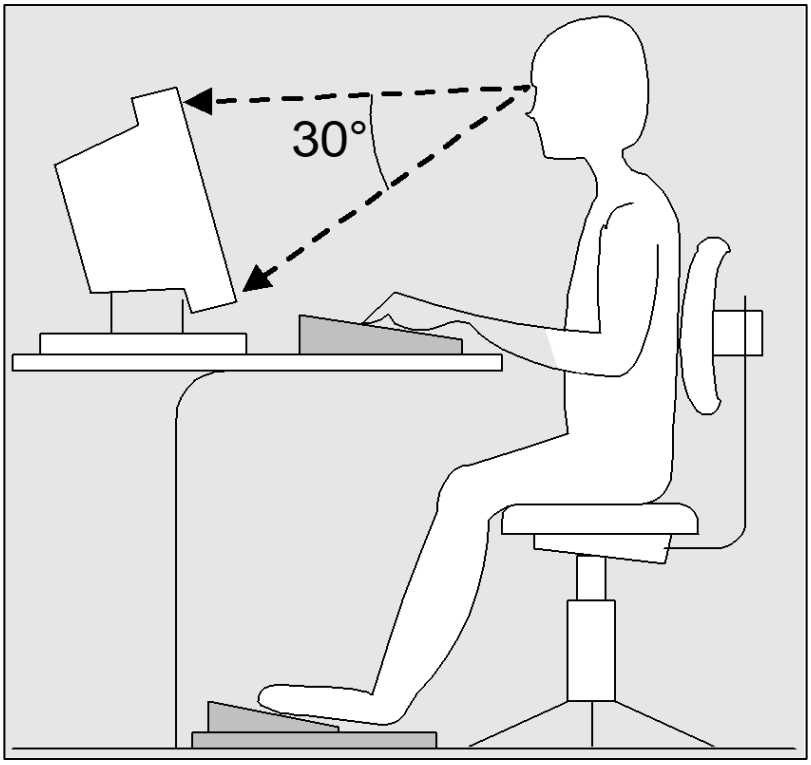


Figure 8 Optimal height of the work desk

4.3.9.2 Light

The workplace should have natural daylight and sufficient and adequate lighting. The lighting should be set up to create and ensure a balanced contrast between the screen and the rest of the work area.

The screen should be positioned so that the line of sight is parallel to the window. The lighting should not be reflected in the screen and should not cause glare. If the ideal position for the screen is not possible due to spatial constraints, other suitable measures must be taken to prevent glare and reflections.

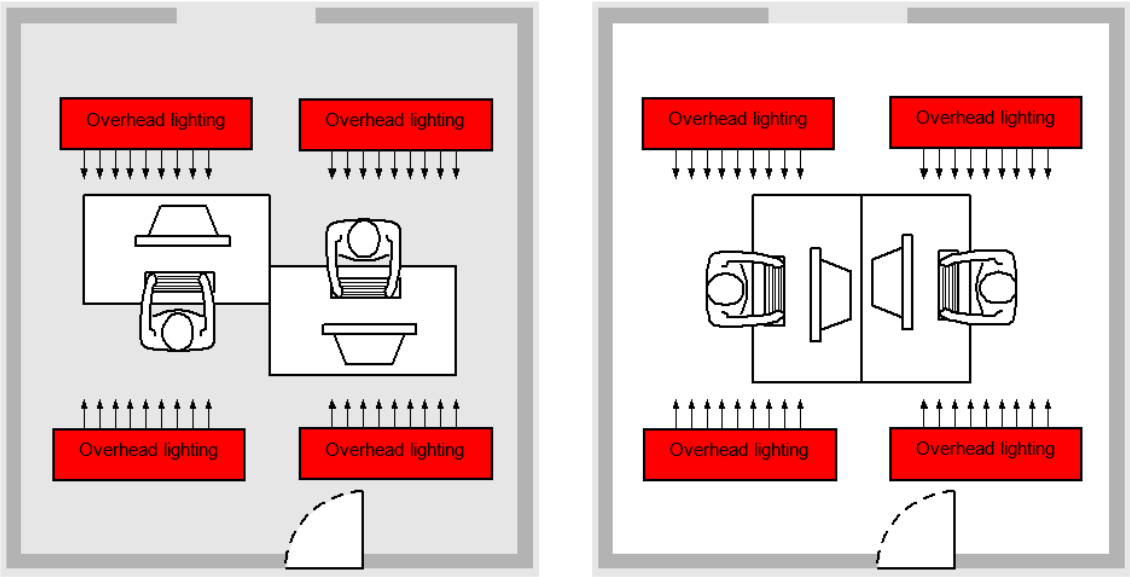


Figure 9 Incorrect (left) and correct (right) positioning of the workstation.

4.3.9.3 Noise

The testing must not be disturbed by noise. Taking into account external noise, a noise level of 50 dB(A) must not be exceeded.

4.3.9.4 Temperature

The room temperature at the workstations must be between 19° and 25° C. The air speed must not be more than 0.1 m/s. The air humidity should be between 30% and 70% or between 40% and 70% if air conditioning is used.

4.3.9.5 Breaks

The test administrator is responsible for deciding on the timing of breaks; this should take account of test taker's needs. In test batteries breaks can be inserted between individual tests using the PAUSE program module.

4.4 Settings

4.4.1 License management

To check how many licenses you still have available in your environment(s):

- Open *Environment details* page (see screenshot below)
- Navigate to *license settings*

There you can see all remaining licenses, including:

- Test licenses: remaining licenses for individual tests, test sets, and the SCHUHFRIED Selection (SFS)
- Report licenses: remaining licenses for Premium Reports
- System licenses: details on licenses for the VTS Admin Client/Portal, including the number of concurrent users and the license expiration date

To view how many licenses have been consumed in your Environment(s):

- Open *Environment details* page
- Navigate to ***License usage***
- Define the time period to display consumed licenses

Information on how to install licenses can be found on the page Install licenses. Licenses can be purchased on our Marketplace.

4.4.2 How to add users and limit their access

4.4.2.1 Add users

If several people want to work in the VTS, a separate user account can be created for each person. The number of users per environment is currently not limited. Additional licenses must only be purchased if several users will be using the system simultaneously.

4.4.2.1.1 How to add new users

To add a new user, proceed as follows:

1. Open the user management under the menu item *Users*
2. Select the *Add user* button
3. Enter the required data for the new user: email, first name, last name, security level (see Security levels of VTS users), department if applicable (see below)
4. Automatic invitation to register by email

The new user can then register themselves via a link and will be automatically activated for the relevant environment.

For users whose registration has not yet been completed, the invitation link can also be created and sent again at any time by clicking on the user name (button *Create invitation link*).

4.4.2.2 Limit access for certain users

4.4.2.2.1 Change security levels

By calling up the user details (by clicking on the name), the assigned security level for each environment can also be adjusted retrospectively. To do this, click on the *Edit* field under the three-dot icon. The security level, cost center, and department can then be assigned.

> Creating new users and many other settings can only be carried out by a user with the highest security level 0. It is therefore important that at least one user with security level 0 is assigned to each environment.

4.4.2.2.2 Change department

Besides security levels, another option for limiting access for certain users is by specifying the “department”. If users are assigned to a certain department, they will only see personal and test results data from test persons which were assigned to the same department (see Person management) or which were not assigned to any department. Users assigned to a specific department can only add new test persons which are assigned to the same department.

4.4.3 Import test batteries

In the *Settings*, under the *Test Batteries* tab, you can import your own test batteries or test batteries with customer-specific scoring that were provided by SCHUHFRIED. After importing, they can be found under *Testing* --> *Test Batteries* (see also Usage). If the test battery also includes customer-specific scoring, this will be available as an additional scoring method for completed tests from the test battery.

Test batteries to be imported that include customer-specific evaluation have the file extension ‘.bstp’, while test batteries without specific evaluation have the extension ‘.stp’.

4.4.4 Create/import/edit Word reports

In order to turn the numerical results of a test into clear, written text, the VTS lets you take the test results and use them in your own Word template, a Word report. This template can be created for tests and test battery evaluations (**BATEVA**). A Word report enables you to generate individually tailored, text-based summaries of test results, aligned with specific requirements, target groups, and corporate design. It combines flexible, modular text blocks with adaptable graphical elements to deliver personalized, interpretable, and presentation-ready output.

4.4.4.1 Creating a Word report

A Word report in the VTS is based on a customizable template in .docx-format. At certain points in this text, the system can automatically insert individual information such as test person data, test results, or predefined text modules. Placeholders are used in the areas where content is meant to be inserted. These placeholders are always written in square brackets and must begin with **[var…]**. When the report is generated, the VTS automatically replaces each placeholder with the appropriate value.

There are predefined placeholders for basic test person information, such as the current date, the test date, the test duration, name, age, gender, and additional database fields. For example, **[varFullName]** automatically inserts “Last name, First name,” while **[varAge]** inserts the test taker’s age in years and months.

In addition to personal data, you can insert raw test scores, such as processing time, the number of correct answers, or the number of incorrect answers. These values have fixed placeholders, such as **[varCA]** or **[varNA]**.

Many tests also provide norm-referenced scores, which show how a person’s performance compares to a reference group. To insert norm-referenced scores, the placeholder must include the norm scale, the variable code, and the norm sample code. For example, **[varPR-NA/1000]** inserts the percentile rank for the variable “Numerical Ability” using the reference sample with the code 1000. The hyphen and slash must always be included exactly as shown, if a specific norm is to be used. Different norm scales (such as percentile rank, T-score, Z-score, IQ, Stanine, Sten, or C11) and various norm sample codes are available. These sample codes can be found in the Results management. The variable names can be found in the default Word report templates.

Some test variables also provide parameters, which can be inserted by adding **PAR-** before the variable code—for example, **[varPAR-RA]**. These parameters are only available for selected variables.

Instead of inserting a variable value directly, you can also use text modules that change depending on the value of a variable. This is done using a special placeholder format in which you specify one or more conditions and define what text should be output in each case. The system checks the value of the variable and selects the matching text. If none of the conditions fit, the text after “else:” is used. Conditions can include equals, less than, greater than, ranges, lists of values, or even comparisons between variables. This allows you to create dynamic, conditional text—for example, using a participant’s sex to automatically select the correct form of address (“Mr” or “Ms”).

You can also nest placeholders inside one another, meaning a text module can itself contain other placeholders or conditions. This allows for very complex logic when needed.

Beyond text and numerical values, the template can also include **graphic objects**, such as result tables, profiles, item protocols, or variable comments. These placeholders begin with **[obj…]**. When the report is generated, the system replaces them with the corresponding graphic elements. For norm-based graphics, the norm sample code can

be added—for example, **[objPROFILE/1000]**. Graphic objects can also be used within conditional text modules.

Some customized test-evalations (BATEVA) may have calculated additional variables. These can be used by referencing their corresponding indices, e.g., [var1].

4.4.4.1.1 Default Word report templates

For many tests and test sets, VTS already has Word reports available. It also provides example templates that show how to use the different report features, such as variables, text blocks, tables, and profile charts.
You can create these example templates by going to *Settings → Word report templates*. There you can create a new template for a test or test battery evaluation (BATEVA).

Once the example template has been created and downloaded, you can edit it as you wish. To save your changes, go back to the same test or test battery in the *Word report templates* tab and click *Overwrite* on the template you want to update.

> ***For reports that include graphic objects, it is recommended to use Microsoft Word 2003 or later, since older versions may display these graphics incorrectly.***

4.4.4.1.2 Placeholder syntax

The following section explains the possible syntax elements you can use in Word reports. These elements define how data, text blocks, tables, and profiles are inserted into the report.

4.4.4.1.3 1. Basic placeholder structure

- All placeholders are enclosed in **[…]**
- Variable placeholders begin with **[var…]**
- Object placeholders begin with **[obj…]**

4.4.4.1.4 2. Simple Variable Insertion

4.4.4.1.4.1 2.1 Test person data

- `[varFullName]`
- `[varName]`
- `[varFirstName]`
- `[varAge]`
- `[varBirthDate]`
- `[varDate]`
- `[varSex]`
- `[varEdLevel]`
- `[varTestduration]`
- `[varClientID]`
- `[varScoringCode]`
- `[varSUBJECTFIELD01]` … `[varSUBJECTFIELD32]`

4.4.4.1.4.2 2.2 Raw test scores - (Test / BATEVA dependent)

e.g. INT (Inventory for testing cognitive capabilities):

- `[varCA] → Cognitive Ability`
- `[varNA] → Numerical Ability`
- `[varRA] → Reasoning Ability`

These depend on the test or test battery evaluation BATEVA. Check the specific codes in the default Word report template.

4.4.4.1.5 3. Norm value syntax

General structure:

```
[var<NORM>-<VARIABLE>/<SAMPLE>]
```

Examples:

- **Tests:**
  - `[varPR-RA/1000]`
  - `[varT-NA]`
- **Test battery scorings:**
  - `[varPR-1/1000]`
  - `[varT-2]`

Components:

- **NORM:** PR, T, Z, IQ, SN, ST, C11
- **VARIABLE:** e.g., RA (Reasoning Ability), NA (Numerical Ability), Indices (1,2,300,…)
  - Note: Indices are only relevant for test battery evaluation. (BATEVA**)**
- **SAMPLE:** codes like 1000, 1001, 2000, etc.
  - Note: Sample codes can be found in the results management.

4.4.4.1.6 4. Parameter syntax

General structure:

```
[varPAR-<VARIABLE>]
```

Example:

- `[varPAR-RA]`
- `[varPAR-1]`

4.4.4.1.7 5. Conditional text (text modules)

4.4.4.1.7.1 5.1 Basic structure

```
[var<CODE> <OPERATOR> <VALUE> : <Text> | <OPERATOR> <VALUE> ... | else:
<Text>]
```

4.4.4.1.7.2 5.2 Comparison operators

- = (equal)
- < (less than)

- > (greater than)
- <=(equal or less than)
- >= (equal or greater than)
- <> (not equal)

4.4.4.1.7.3 5.3 Range syntax

```
[var<CODE>=10_20: <Text>]
```

4.4.4.1.7.4 5.4 List of values

```
[var<CODE>=1,3,5: <Text>]
```

4.4.4.1.7.5 5.5 Multiple variables (OR-combinations)

```
[varX=0,varY=0: <Text>]
```

4.4.4.1.7.6 5.6 Variable-to-variable comparison

```
[varB>varA: <Text>]
```

4.4.4.1.7.7 5.7 Nested conditions

```
[varA>varB: [varA>varC: <Text1> | else: <Text2>] | else: <Text3>]
```

4.4.4.1.8 6. Graphic object syntax

4.4.4.1.8.1 6.1 Basic objects

- [objRESULTTABLE]
- [objPROFILE]
- [objITEMPROTOCOL]
- [objVARCOMMENTS]

Depending on the test or test battery these can vary.

4.4.4.1.8.2 6.2 Normed graphic objects

```
[objPROFILE/1000]
```

4.4.4.1.8.3 6.3 Graphic objects in conditions

```
[varX<>"--": [objPROFILE/1000] | else: <Text>]
```

4.4.4.2 Importing a Word report

After creating a Word report you want to import it into the VTS, matching it to the correct Test/BATEVA.

If you have created a Word report from scratch, or used an example template as a starting point, you can import it into the VTS. To do this, go to *Settings → Word report templates* and select the test or BATEVA the report belongs to. Create a new Word report template there, if you haven't done so already.
After the template has been created, click *Overwrite* on that template to upload your finished Word file.

4.4.4.3 Editing a Word report

If there are any changes that have to be done, you will need to edit the Word report.

To edit an existing Word report, first download the report file from the *Word report templates* tab. After making your changes in Word, return to *Settings → Word report templates* tab, and navigate to the correct test or BATEVA. Click *Overwrite* on the corresponding template to upload your updated file.

4.4.5 Email configuration for open mode testing

If tests are to be carried out in open mode (see Testing modes), the link to the testing is automatically sent to the test person by email.

This email can be defined in more detail in the *Settings*.

4.4.5.1 Email templates

The subject, content, and format of the email can be specified under *Email templates*. Various placeholders are available for first names, last names, or full names, as well as the invitation link.

Separate email templates can be created for each language. Test persons receive the email in their selected test language.

4.4.5.2 Email configuration

Under *Email configuration*, you can specify the settings for the mail server used to send emails.

The SMTP server and the corresponding port can be specified, as well as the user name and password for the outgoing mail server. It is also possible to configure the email address and the name displayed for the sender.

In addition, SSL encryption can be enabled or disabled and read receipts can be activated.

4.5 Tools

4.5.1 Test Generator

The Test Generator allows users of the Vienna Test System (VTS) to create questionnaires, surveys, knowledge tests or even simple performance tests themselves. Different types of test pages are available for this purpose, offering various options for displaying content and recording the respondents' answers.

Creating a test in the Test Generator involves several steps:

1. Create a new test, make the necessary settings, add and design the individual test pages (see Design a new test)
2. Set the scoring (definition of variables, see Set the scoring)
3. Create a results report to output the results in the VTS (see Create the results report)

The tests created in this way can then be presented in the VTS, provided the necessary licenses are available. To run the tests, you need either "TQ" licenses or SCHUHFRIED Selection licenses in your VTS.

This user guide describes the individual steps for creating tests in the Test Generator. In the individual chapters you will find instructions and examples for designing tests, surveys or questionnaires. Below on this page you can also find a collection of frequently asked questions (FAQ).

Important information / Disclaimer
SCHUHFRIED accepts no liability for the results of tests created with the Test Generator. In addition, the user of the Test Generator is solely responsible for the content of the tests or questionnaires created with the Test Generator.

Please note the conditions for using the Test Generator set out in the General Terms and Conditions of the Vienna Test System.

4.5.1.1 FAQ

4.5.1.1.1 Test creation

Q: What types of tests can I create?

A: The Test Generator is designed to enable the creation of knowledge tests, questionnaires or surveys or even low-complexity ability tests. Various types of test pages are available for this purpose. Each test page is designed to support different types of questions and answers. For example, you can create feedback questionnaires, knowledge tests, personality questionnaires, opinion surveys and questionnaires for assessing the quality of training or clinical evaluations.

Q: Can I use images?

A: Yes, images can be added to the various test pages. The editor menu can be used for this. This appears when text is selected (option: *Add image*). Images can also be added using drag & drop. Standard image formats like .jpeg, .png, .webp and .gif are supported. Please consider to make the images as small as possible (file size) to maintain a high performance.

Q: Why does the test label of my test have to start with TQ?

A: The tests you create require a special license in order to be used. The "TQ" at the beginning of the test name enables the program to recognize that the test does not originate from SCHUHFRIED and requires this special license for use.

Q: Can I change the name of my test?

A: The name of your test cannot be changed after you have saved it for the first time. If you need to change it, you can duplicate the test and change the name when you create the duplicate.

Q: Why is my test locked?

Q: If you see a lock symbol next to the name of your test, this means that another user is currently editing this test. Although you can open the test in edit mode, you cannot save any changes. If the other user closes the test after editing, you can open the test again in normal edit mode.

Q: Is there a limit to the number of test questions?

A: There is no fixed upper limit, but practical limitations may depend on the scope and length of the test you wish to create. In particular, the reasonableness of the test administration (e.g. duration and strain on the respondent) should be considered.

Q: What are the page name and phase of a test page used for?

A: The page name allows you to give your test pages a name, which helps you to keep track when you Delete test pages or set the scoring.

Settings for the test phase, which is available via a drop-down menu, determine whether the test page is an instruction element or part of the actual test to be scored. Only pages with the "Test" phase are available for scoring. Please note that a newly created test page always adopts the test phase settings of the last test page in your test. Make sure that you check and adjust the phase for each new test page as required to ensure that they are set correctly.

Q: Can I duplicate my test to create a new version?

A: Yes, you can duplicate existing tests to create new versions so that you can easily modify and reuse previous versions of the test. To do this, go to the main page of the Test Generator, on the right side of your test you will see a button next to it, which has the shape of three dots. Click on it, select "Duplicate" and rename the duplicated test. You now have an exact copy of your original test.

Q: Can I add norms to my test?

A: Yes, you can add norms to your test using the norms editor. Go to the main page of the Test Generator. On the right-hand side of your test, you will see a button with three dots. Click on it and select Norms to open the norms editor. Here you can add both simple norms or norms for specific socio-demographic subgroups to your test.

Q: How do I implement the feedback function correctly for a test question?

A: To ensure that the test participant understands how to edit the test correctly, you can add instruction items that provide feedback if, for example, a question is answered incorrectly. Add the text that should be displayed when the condition (incorrect answer or no answer) occurs in the corresponding fields on the pages under *Feeback*.

When setting up the feedback, make sure to configure the other options correctly so that the question can be answered correctly. For example, if a question has multiple correct answers, select "Multiple Choice" as the answer modality. If you select "Single Choice", the test participant would only be able to select one answer and would not be able to answer the question correctly, which is why the feedback would always be displayed.

You also have the option of displaying feedback if no answer option has been selected and the participant tries to skip the question. This type of feedback can also be used in the test phase to prevent respondents from skipping pages without providing input.

Q: Why is the Save button grayed out?

A: If important Settings are not configured, you will not be able to save your test. Fields and Settings that are not filled in correctly will show red text until they are filled in correctly. Make sure that all these Settings are set or entered correctly to activate the Save button. It is also possible that the entries are in an Incorrect format. In this case, please note the notes shown in red regarding the entries.

4.5.1.1.2 Test Scoring

Q: Why do no test pages appear when setting up a variable?

A: Make sure that the phase of the relevant pages is set to "Test" in order to include them in the evaluation and variable evaluation.

If you have created several test pages but these are not displayed for selection in the variable settings, it may be because the phase of the pages is still set to "Instruction". Instruction pages are not taken into account for scoring the test participant's results and therefore cannot be selected for scoring a variable.

Q: What does the option 'Selected pages are selectable as scale when configuring the tests' do?

A: You can use this option to make the test procedure configurable by making certain question groups (scales) selectable. If this option is activated for several variables, you can select which scales (question groups) are to be included in the test procedure when configuring the test.

For example, if you create a questionnaire with three scales on *General Information*, *Drinking Habits* and *Hereditary Diseases*, you can choose which of the three scales to use when configuring the test procedure.

4.5.1.1.3 Test result report

Q: Why do all the answers appear red in the test protocol even though I have set some of the questions to have no correct or incorrect answer options?

A: In the results report, the answers are color-coded based on the evaluation criteria defined for each subtest. Currently, the report can distinguish between "Correct and Incorrect" (= green and red) or "Neutral" (= blue) scores on a subtest basis.

Correct/incorrect scoring: If at least one question within a subtest is coded with correct/incorrect answers, this color scheme is automatically applied. Correct answers are displayed in the report as green with a plus sign and incorrect answers as red with a minus sign. Questions for which there is no correct or incorrect answer are displayed in the report as red with a question mark at the end of the answer.

Neutral scoring: If no questions within a subtest are coded as correct or incorrect, this color scheme is applied and all answers for this subtest are displayed in blue with a question mark.

Q: My respondent has completed the test, but no results are displayed in the "Results" tab. What could be the problem?

A: There are two possibilities: Either the relevant test pages have not been set as part of the test phase and are still set as instruction pages, or a results report has not yet been created. Please check the settings of the test pages and make sure that a results report has been created.

4.5.1.1.4 Test installation

Q: How do I install my test?

A: To install your test, go to the main page of the Test Generator. On the right-hand side of your test, you will see the "Install" button in the form of a triangle. Press this button to install your test. Please note that once you have installed a test, you can only overwrite it with a newer version, not uninstall it!

Q: Why do I have to install a test before I can use it in VTS Online?

A: When you create and save a test in the Test Generator, you only create the files that the VTS needs for your test to work. Before using, these files must be installed in the VTS so that you can use your test. This is a technical requirement that allows you to make changes to your test without impairing the testing performed with an already installed version.

Q: The test I created with the Test Generator is only executed in demo mode. How can I execute the test without restrictions?

A: To be able to use your test in full, you need a special license (TQ or SFS license). You can purchase this license in the VTS Marketplace or from your SCHUHFRIED sales representative.

4.5.1.1.5 Further questions

Q: Is it possible to present the tests on the cell phone / tablet?

A: Yes, the tests generally work on smartphones and tablets. However, it is recommended to check individually whether all content is easy to read and whether the answer options can be selected sufficiently well on a mobile device. The presentation of the test content depends on the configuration of the test. In particular, the number of answer options or questions per page and the size of any images can influence how well the test can be edited on a cell phone.

Q: Can I export the data from my test?

A: Yes, you can download the results as a PDF in the "Results" tab or you can export the results of your test participants as .csv file format.

4.5.1.2 Design a new test

You can use the Test Generator to create your own test or questionnaire for the Vienna Test System (VTS). This section provides an overview of the options for creating and configuring your own tests.

4.5.1.2.1 How to create a test

Start by clicking on *Create test* in the dashboard (main page) of the Test Generator. You can select a template by selecting *Create test from template*. This will load a pre-configured, fully functional test that you can use or customize to your needs.

Figure 10 The dashboard of the Test Generator

If you decide to start without a template (*Create test*), you will see a new test without customized settings and a blank instruction text page.

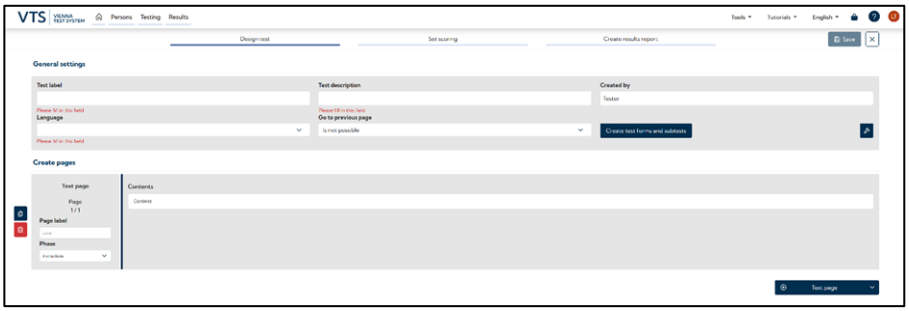


Figure 11 View when first creating a new test

4.5.1.2.1.1 Make the necessary settings

To begin with, you will find the *General Settings* for the test at the top. Here you can give your test a *test label*, add a *description* that will be displayed in the VTS and specify the *language*. The *language* should match the language of the test content. For example, if your content is written in German, please set it to German (de-DE), as the Vienna Test

System checks whether the language of the test matches that of the respondent. You can also specify whether and how respondents can navigate back to previous pages in the test during the test phase (*Go to previous page*).

> **Attention**: Please note that the test label must be unique, must begin with "TQ" and cannot be changed after the test has been saved for the first time.

4.5.1.2.1.1.1 Subtests and test forms

For more complex tests, additional sub-tests and test forms can be defined here (*Create test forms and subtests*). Test forms can be used to create different variants of a test (e.g. a short and a long form of a questionnaire). Each test form must contain at least one subtest. Test forms can be selected in the VTS (you must select which test form is to be specified). The subtests can be assigned to the test forms via drag & drop (or via the corresponding buttons with the arrows). In addition, the duration per subtest (in minutes) can be specified in this window, which is displayed to the test user in the VTS.

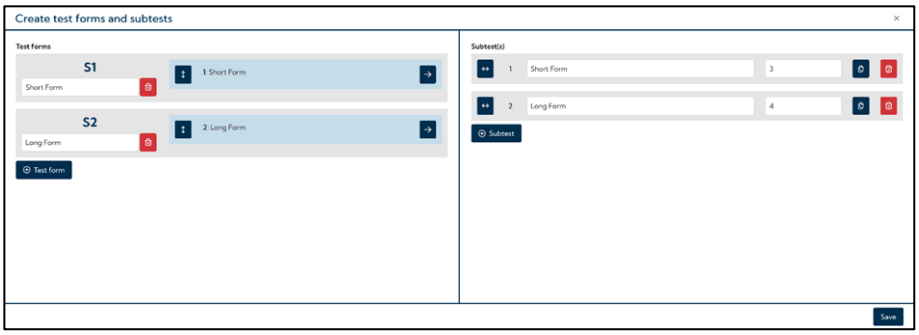


Figure 12 Window for creating subtests and test forms.

If several subtests are defined, the *Design test* tab can now be used to select the subtests for which test pages are to be added and edited (see the image below).

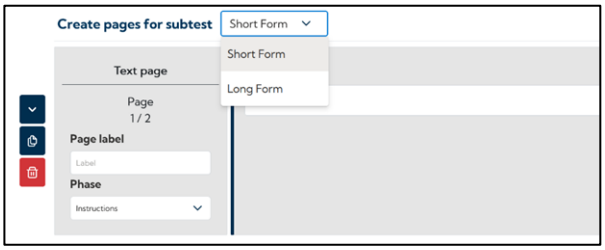


Figure 13 Subtest selection for editing.

4.5.1.2.1.2 Create test pages for your test

Under *General settings*, in the *Create pages* section, you can add and configure the individual test pages for your test.

If a page is not selected for edit, a **preview of how the page will be displayed in the VTS is shown** (see image below). By clicking on the page preview, you can edit its content, duplicate or delete the page, and change the order.

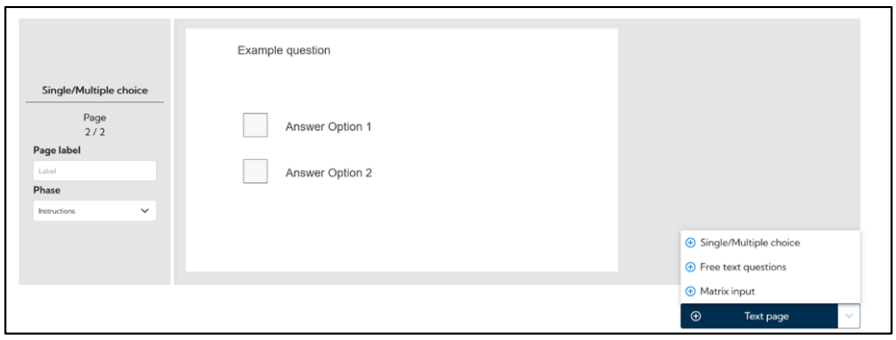


Figure 14 A test page displayed in preview mode.

Note: The preview of the test pages does not show exactly how the page content is displayed in the test, as this depends on the screen or window size, and this is different in preview mode than in the test.

When you add a test page, you can choose between different types of test pages. The following types of pages are available:

- Text page
- Single/multiple choice page
- Free text question
- Matrix input

4.5.1.2.1.2.1 Text page

This page can, for instance, serve as an introduction or instruction page. The respondent cannot enter any answers on these pages; they can only read the content and navigate. This page can also display images.

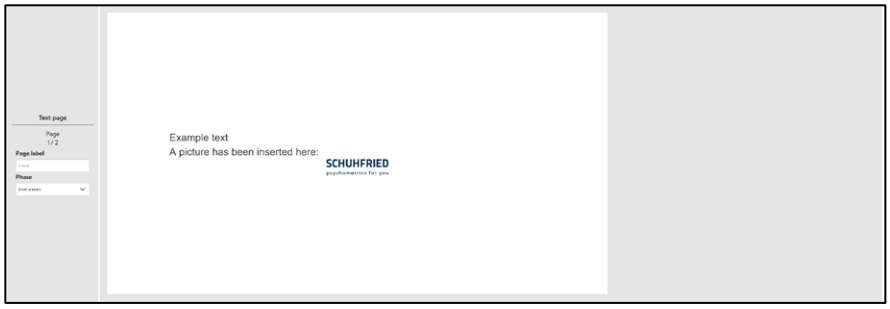


Figure 15 Example of a text page with image.

Setting options

Text and images can be added in the *Content* field.

4.5.1.2.1.2.2 Single/multiple choice

This page allows you to create questions with correct or incorrect answers where the respondents must select one or more correct answer options. However, this page can also be used to create rating scale tests where no answer options are correct or incorrect.

For questions in rating scale format, it is important to set that no answer is correct. Examples showing how to evaluate rating scales can be found on the page Set the scoring.

You can also set whether the answers should be displayed horizontally or vertically and whether the participants can only select one ("single choice") or several answer options

("multiple choice"). Please note that you must set the answer modality to multiple choice if several answer options are correct, as otherwise the respondent will never be able to select all the correct options.

On this page, images can be added to both the question and the individual answer options.

Figure 16 Example of single/multiple choice pages

Setting options

A text and/or image can be inserted in the *Question* field, which is displayed above the answer options.

On each single/multiple choice page, you can add answer options using the button + Answer option. At least one answer option must be added, the maximum number depends on the content, care should be taken to ensure a sufficiently large and legible display.

If the *No correct/incorrect answers* checkbox is selected, the answer options do not have to be marked as correct or incorrect. This allows you, for example, to create rating scales.

The field *Text below the answer options* can be used to display an additional text or note below the answer options.

In the *Feedback* section, you can enter a text in the field *Feedback when an incorrect answer option is selected*, which will be then displayed to the respondent if an incorrect answer was selected (or if the correct answer was not entered). As long as the feedback is displayed, the respondent cannot navigate to the next page. This option can be used to ensure correct understanding of the task/handling of the test during the instruction phase. In the test phase, the use of such feedback usually makes no sense. In the field *Feedback when no answer option has been selected*, a text can be entered which is then displayed to the respondent if they have not selected an answer option and try to navigate to the next page. This can be used to prevent test pages from being skipped. The respondent must then select an answer option in order to proceed to the next page.

In the *Settings* area, you can specify whether the response options are arranged vertically or horizontally (*alignment of the response options*), whether only one answer option can be selected (single choice) or several (multiple choice) and whether it is automatically navigated to the next page when an answer was selected (*automatic navigation*). Automatic navigation is only possible if single choice is selected.

4.5.1.2.1.2.3 Free text questions

This template allows you to enter a question or an image in an area provided for this purpose. There is a separate field below the question or image in which test participants can enter their answers freely as text. The person has 250 characters available for the answer entry.

Figure 17 Example of a free-text question (the area outlined in blue represents the input area for the respondent)

You have the option of pre-filling the answer field with a text, e.g. to prompt participants to enter their answers. This template is suitable for questions that require detailed, descriptive or explanatory answers (e.g. to obtain feedback).

> The scoring of the entries for free text questions must be done manually.

Setting options

A text and/or image can be inserted in the *Question* field, which is displayed above the text input field.

The field *placeholder for the answer field* can be used to define a text that is displayed to the respondent in the answer field and disappears as soon as the person enters an answer themselves. This can be used, for example, to provide instructions on how to answer the question.

In the field *Feedback when no answer option has been entered,* a text can be defined which is displayed to the respondent if no answer has been entered. This can be used to prevent test pages from being skipped. The respondent must then enter an answer in order to proceed to the next page. However, the system does not check what answer is entered or how long it is.

4.5.1.2.1.2.4 Matrix input

With this template, you can create a list of questions that are displayed in the rows of a matrix. The respondents can then rate these questions using the answer options shown in the columns of the matrix. Additional text, like a question or instructions can be displayed above.

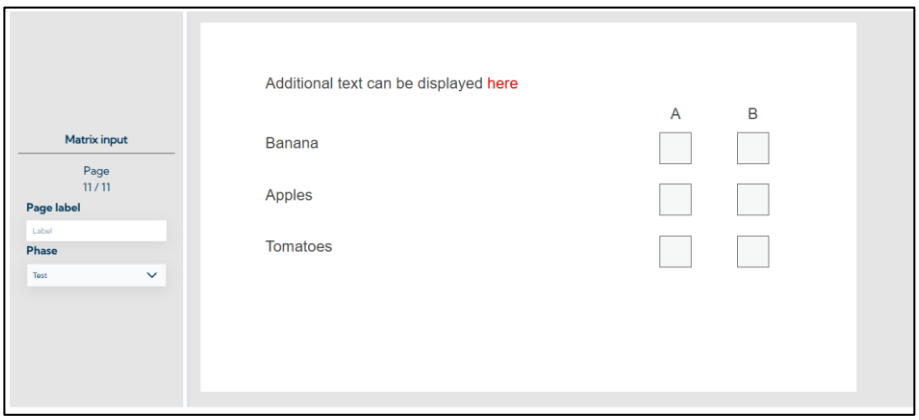


Figure 18 Example of a matrix input page

Setting options

On the left-hand side, one or more questions can be added in the *Questions* section (plus button) and one or more answer options can be added in the *Answer options* section. The texts to be displayed for the questions and answer options can be defined via the respective fields. The answer options cannot be marked as correct/incorrect (for scoring examples see Set the scoring.

The field *additional text (displayed above the matrix)* allows to set a text or question that is displayed on the page above the answer / question matrix.

In the field *Feedback when no answer option is selected*, a text can be defined which is displayed to the respondent if an answer has not been entered for at least one question. This can be used to prevent test pages from being skipped. The respondent must then enter at least one answer in order to proceed to the next page.

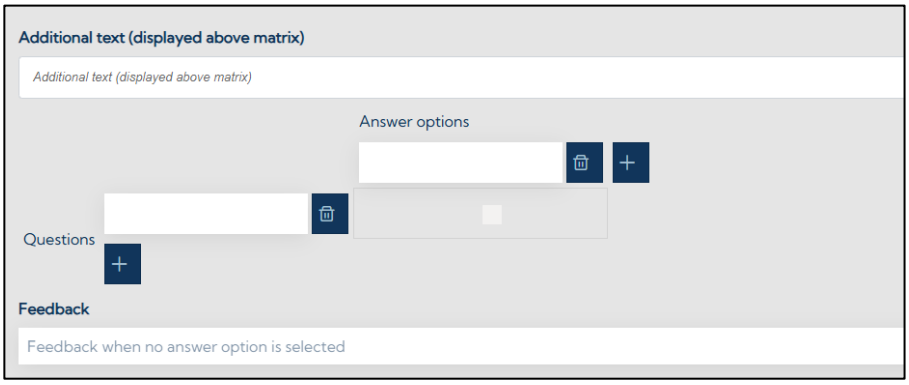


Figure 19 Settings of the matrix input page.

4.5.1.2.1.2.5 Additional settings

Phase

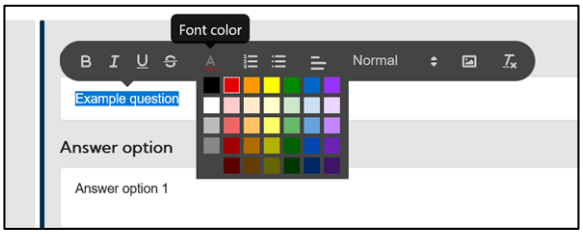
For each page in the test, either "Instruction" or "Test" must be set in the *phase* drop-down menu on the left-hand side. Only the pages that have "Test" set as the *phase* are included in the scoring of the participant's test results. Instruction pages serve as instructions for the test and offer the opportunity to practice sample tasks but are not included in the scoring.

Page label

You also have the option of giving each test page a name in the *Page label* field. This gives you a better overview when you delete the test pages or select them for the calculation of variables when you define the scoring for your test.

4.5.1.2.1.2.6 Formatting options

Much of the content on the test pages (text, images) can be formatted by the user and its appearance adapted. The text color or size as well as the alignment (left-aligned, centered) for instance can be adjusted. To apply these options, the content must be selected with the mouse; an editor then opens where the settings can be made.



Add images

This editor (see image above) can also be used to add images. Images can also be dragged and dropped into the corresponding input fields, provided this function is supported. Standard image formats like .jpeg, .png, .webp and .gif are supported.

Attention: When adding images, it is advisable to ensure that the file size is as small as possible in order to avoid problems during execution due to long loading times of the individual test pages.

4.5.1.2.1.2.7 Deleting and changing the order of pages

You can **delete one or multiple pages** by selecting a page, clicking on the red “bin” button and selecting the pages for deletion. After confirming with *Yes,* the pages will be deleted.

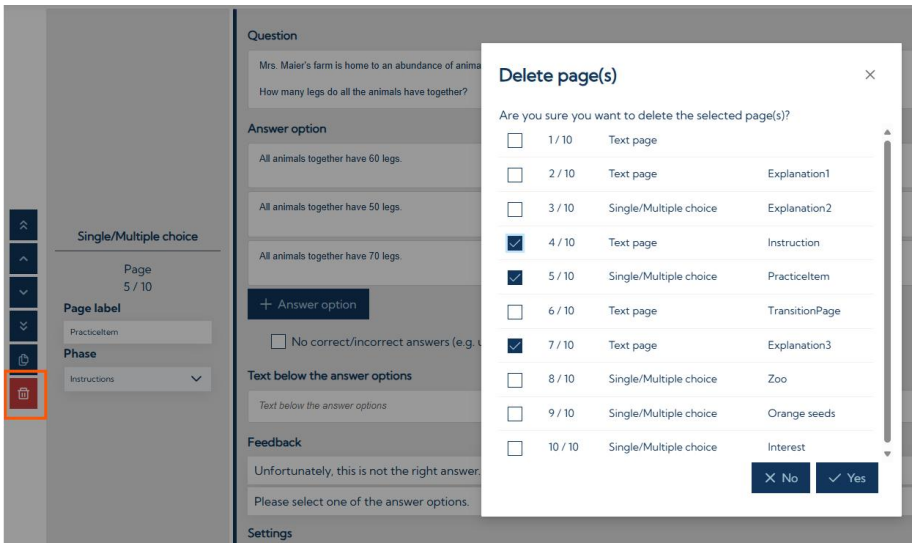


Figure 20 Page deletion.

You can **change the order of the pages** using the arrow up / arrow down buttons on the left side of each page (see image above). There is also an option to move a page to the beginning or the end of the test. The order of the pages in the editor matches the presentation order of the pages.

4.5.1.2.1.3 Next steps

When you are done creating the test content, you can continue with the setup of the scoring and the creation of the results report. Visit the pages Set the scoring and Create the results report for a guide on how to do that.

4.5.1.3 Set the scoring

You can create and organize variables in the *Set scoring* tab. These variables are used for scoring the test and calculate different values based on the respondent's entries, depending on the *calculation method* selected.

Each variable requires an abbreviation (*short name*), which is displayed as an identifier when setting up the results report elements, and a full name (*description*), which then appears in the results report.

On the right-hand side of your variables, you will see a *copy button* (represented by two overlapping pages), a *settings button* (represented by a cogwheel) and a *delete button* (symbolized by a trash can).

Figure 21 Example of a newly created variable.

Once you have created a variable, you must define how each variable is calculated (*calculation method*), the subtest (see Design a new test) for which the variable is to be calculated (*subtest*), and specify which pages of the subtest are considered during the evaluation (*Settings button*). By default, all questions of a subtest are included in the scoring, which is indicated by *All pages* on the right-hand side. If only one subtest is defined, it is used for the calculations by default and no subtest needs to be selected for the calculation.

This guide first explains the available calculation methods, then describes the creation of scales and finally gives a series of examples, how different scorings for common types of questionnaires and tests can be set up.

4.5.1.3.1 Calculation methods

There are various calculation methods available. These are:

- Number of correctly answered pages
- Working Time
- Number of pages answered
- Percentage of correct answers
- Weighted sum
- Mean value

4.5.1.3.1.1 Number of correctly answered pages

This method calculates the number of pages where the respondent has selected all correct answer options. If multiple answer options are correct for a question, all of them must be selected by the respondent to count as correct. If a question is set so that it has no correct/incorrect answers, it cannot be scored using this calculation method. The evaluation is based on the pages that were selected for scoring via the *Settings button* (by default, all pages of a subtest).

4.5.1.3.1.2 Working time

This method calculates the total time it took the participant to answer the pages selected on the *settings page*.

4.5.1.3.1.3 Number of pages answered

This method evaluates how many of the selected questions or pages were actually answered by the participant. If a participant skips a question by clicking on the 'Next' button without entering an answer, this question is counted as skipped and does not increase the value.

Note: If you do not want your participants to be able to leave a question unanswered, you must set up a "No selected answer option" feedback. Feedback will appear if the participant tries to continue without having answered the question and they will not be able to continue until they have given an answer.

4.5.1.3.1.4 Percentage of correct answer

This method calculates the percentage of the selected questions for which the participant has chosen all correct answer options. If a question is set so that it has no correct/incorrect answers, it cannot be considered for the calculation.

4.5.1.3.1.5 Weighted sum

This method allows you to assign a specific number, i.e. a weight, to each answer option on a single/multiple choice or matrix input page. The variable is calculated by summing the weights of the selected answers on the relevant pages. Possible use cases include, for example:

Partial points: For example, you can assign one point (= weight 1) to each correct answer option and zero points (= weight 0) to incorrect answers. This method gives a better insight into the participant's performance, even if they do not select all the correct answers for a question (e.g. 2 out of 3 correct answers).

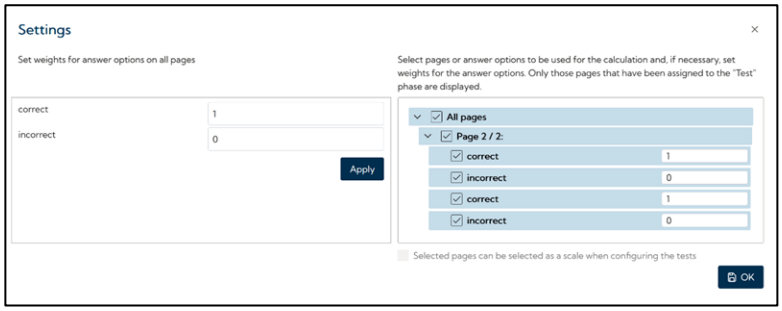


Figure 22 Example of the weighting of a question to calculate partial points.

When calculating partial points, it may be necessary for the sake of a better overview to create a separate variable for each question that is scored in this way.

Rating scales: Weights can be used for scoring rating scales. These can indicate the different degrees of agreement or subjective importance of the various answer options, e.g. 0 for "strongly disagree" and 4 for "strongly agree" with various gradations in between.

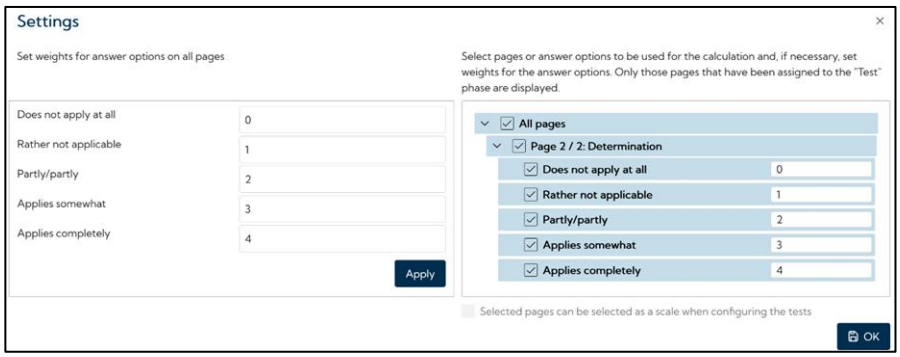


Figure 23 Example of using weights for scoring a rating scale.

Note: If the same weight is to be assigned to the same answer options across several questions, this can be assigned automatically by assigning the weights to the answer options on the left-hand side of the *Settings* window and then pressing *Apply*. In the example above the answer option "Does not apply at all" would be assigned the weight 0 on all pages in the test where it occurs.
Please note that the weights can currently only be set only on page level. That means that setting different weights in different variables for the same page does **not** work.

4.5.1.3.1.6 Mean value

This method calculates a mean value based on the weights of the answer options. To do this, the sum of the weights of the selected answer options is divided by the number of selected answer options. The weights are set as described in the *weighted sum* calculation method (see section 3.1.5). Possible use cases include, for example:

Scale means: you use rating scales (e.g. with response options from “strongly disagree” to ‘agree’, where each response option is assigned a weight (e.g. 0 for “strongly disagree”). If, for example, a person chooses answers with the weights 1, 1 and 3 across three pages, the mean value across these three pages can be calculated using this calculation method (mean value = (1+1+3) / 3 = 1.67).

> **Note**: As the number of selected answer options is used for calculation, it is not recommended to use this calculation method for test pages with multiple-choice answer input (on test pages of the single/multiple choice type).

4.5.1.3.2 Scales

By default, all test pages within a subtest are included in the variable calculation. If only some of the questions or test pages are relevant for the calculation of a variable, you can deselect those that are not relevant in the settings of the variable. For a better overview, we recommend naming your test pages in the *Design test* tab in the *Page label* field. An example of this can be found in the screenshot below:

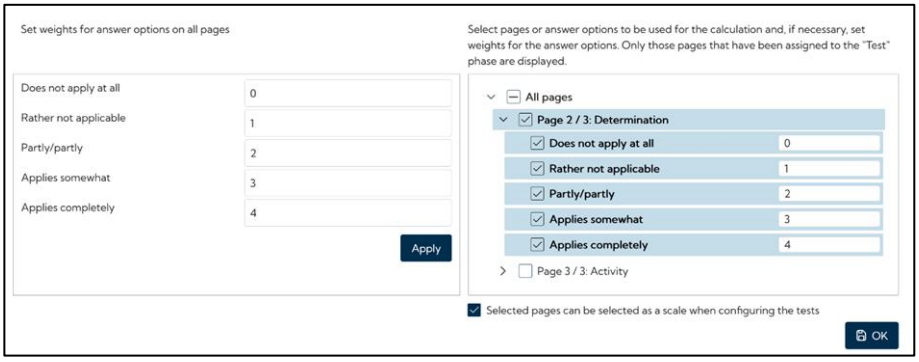


Figure 24 Example for the settings of a scale in the settings window of a variable.

In the example above there are two test pages (page 1/3 is an instruction page and therefore not shown in the variable settings). For the variable that captures "determination", only page 2 was selected for scoring, which also has the corresponding content.

Activating the option *Selected pages can be selected as a scale when configuring the test* at the bottom of the variable settings allows the scale to then be selected when configuring the test presentation in the VTS. This option makes it possible to show the participant only some questions/test pages for testing. In the example above only the question on "Determination" could be presented to the test person, for example, but not the question on "Activity".

> **Attention**: Please note that the use of selectable scales is only possible if your test consists of test forms that only contain one subtest each. This is due to technical limitations and must be taken into account when creating the test.

4.5.1.3.3 Evaluation examples

4.5.1.3.3.1 Correct / Incorrect answers: Knowledge test template

Our *knowledge test* template comprises 10 pages: 6 text pages, 1 sample item and 3 test items. The test items each have one correct answer. In this example of scoring, we have created two variables. The variable "WT" measures the time it takes the participant to go through all three test pages by applying the *working time* calculation method to all pages. The variable "CORR" indicates how many of the three questions were answered correctly in the test phase by applying the calculation method *Number of correctly answered pages* to all pages:

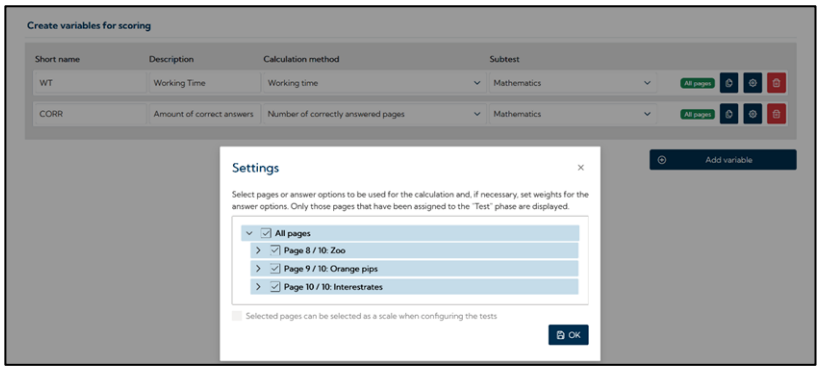


Figure 25 Example of scoring questions with correct and incorrect answers.

4.5.1.3.3.2 Personality questionnaire with dichotomous response format

You have created a test with 12 single-choice pages designed to measure four personality traits (E.g.: "sociability ", "creativity", "independence" and "conscientiousness") to be captured by the respondent's self-assessment. Each page consists of a statement and the option of agreeing or disagreeing with it. Each question is set to *no correct/incorrect answers* and *single-choice*. In this example, each personality trait is measured by three questions (in a real test, more questions may be needed to ensure sufficient measurement accuracy).

For scoring, create a variable for each of the four scales (the measured personality traits) and select *Weighted sum* as the calculation method. Use the variable setting to enter 0 as the weighting for "disagree" and 1 as the weighting for "agree" and press "Apply".

Then, in the Settings window for each variable, deselect all pages and select only those pages that are relevant for your scale variable, e.g. only the 3 pages that are relevant for conscientiousness.

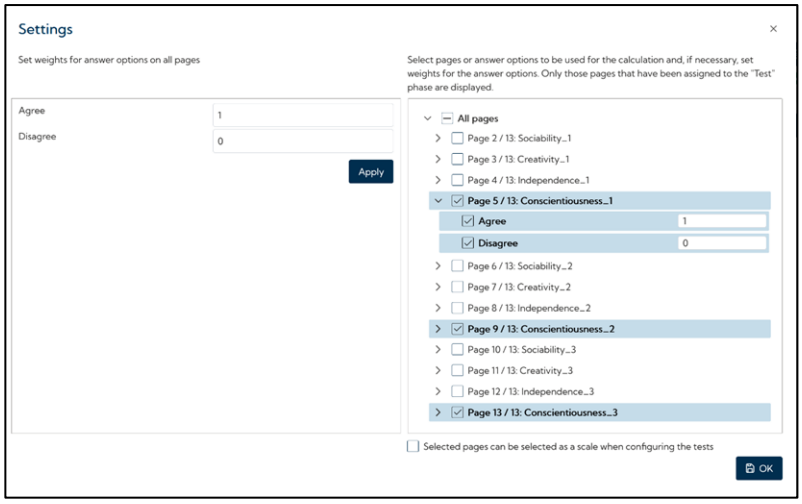


Figure 26 Example scoring of a dichotomous personality questionnaire.

Optionally, it is possible to make the scales selectable (activate checkbox *Selected pages can be selected as a scale when configuring the tests*) in order to adjust the test presentation as required (e.g. show your participant only the questions for "Conscientiousness" and "Independence").

For questions where the polarity / key is reversed (e.g. "I prefer to be alone" for "Sociability"), you must adapt the assigned weights manually (set Agree → 0; Disagree → 1). For a better overview of the weighting of the individual questions, it is advisable to clearly label the pages, e.g. to use a "-" in the page label for items with reversed polarity.

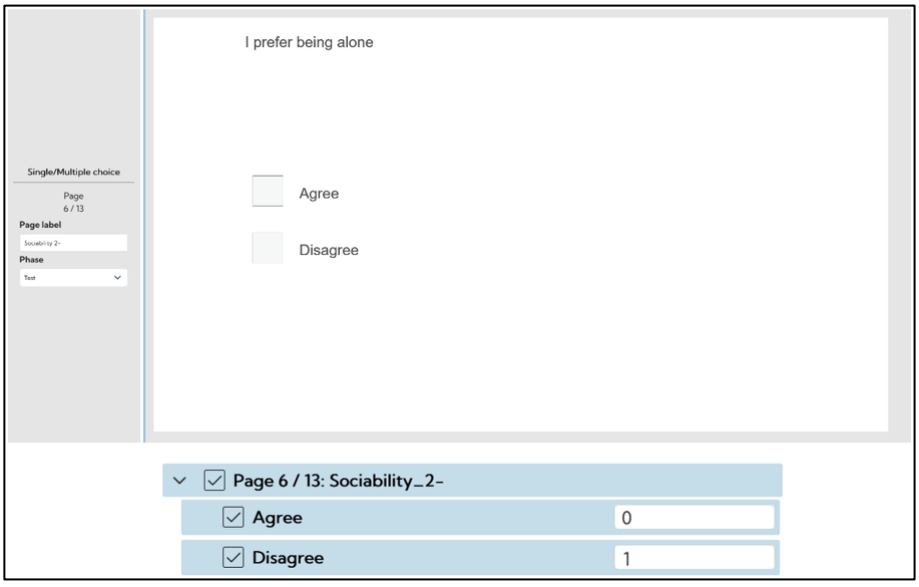


Figure 27 Example of an item with reversed polarity.

4.5.1.3.3.3 Personality questionnaire with Likert-scale response format

You have created a test with 12 single-choice pages designed to measure four personality traits (E.g.: "sociability", "creativity", "independence" and "conscientiousness") to be captured by the respondent's self-assessment. On each test page, a characteristic (e.g. "I like meeting new people") is described and the respondent is asked to rate themselves on a scale from "Does not apply at all" to "Applies completely". Each question is set to *no correct/incorrect answers* and *single choice*.

You create a variable for each of the four personality traits measured and select "Weighted sum" as the calculation method. Using the variable setting, enter e.g. 0 as the

weight for "Does not apply at all" to 5 for "Applies completely" and press *Apply*. Then deselect all pages and select only those pages that are relevant for your scale variable (e.g. only the pages that are relevant for "Conscientiousness"). An example is shown below. As described above it is also possible here, to make the scales selectable for test presentation configuration.

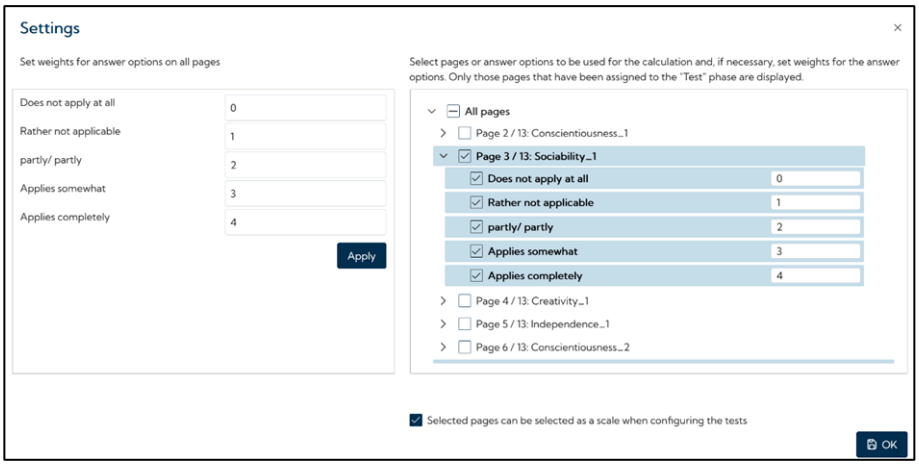


Figure 28 Example of scoring a Likert scale questionnaire.

For questions where the polarity / key is reversed (e.g. "I prefer to be alone" for sociability), you need to adjust the weights manually, e.g. for "Applies completely" → 0, "Applies somewhat" → 1, "Partly / Partly" → 2, "Rather not applicable" → 3; "Does not apply at all" → 4. An example of this is shown below:

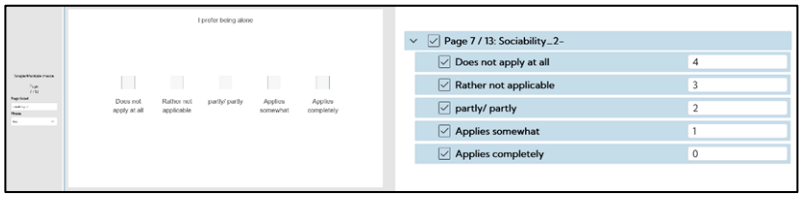


Figure 29 Example of scoring a Likert-scale item with reversed polarity.

4.5.1.3.3.4 Rating scale based on matrix input

You have created a test based on the matrix input page type. On each page there are 4 statements about one's own personality (each capturing a different trait) and 5 answer options from 1 (Does not apply) to 5 (Applies very much), see the example below:

Figure 30 Rating scale using the matrix input page.

You create a variable for each of the four traits measured and select *Weighted sum* as the calculation method. Using the variable setting, enter 1 as the weight for 1, 2 for 2 and so on up to 5 for 5 and press *Apply*.

Then deselect all pages and select only the answers (not the whole pages) that are relevant to your scale variable (E.g. "I like meeting new people" on page 1 and "I quickly strike up conversation with others" on page 3 for sociability), see the screenshot below:

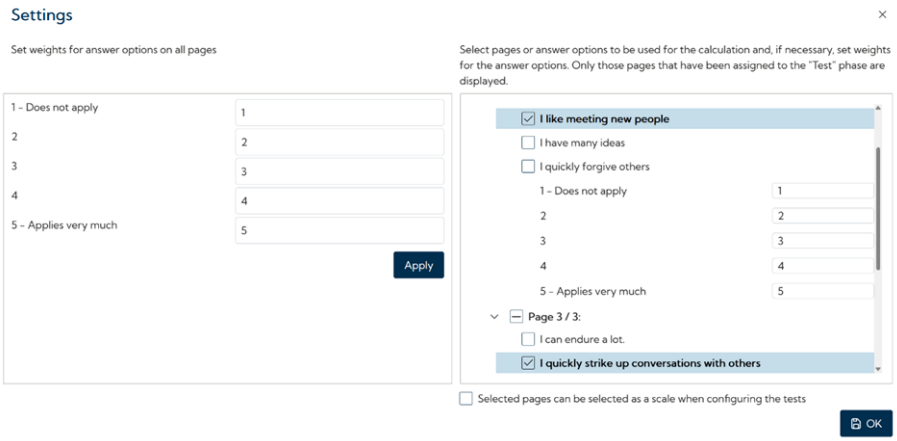


Figure 31 Example of scoring a matrix input page.

Please note that for pages with matrix input, the weights for each question on the page are always the same. You cannot adjust the weights for individual questions (e. g. single items with reversed polarity) for scoring. It is therefore advisable to only use questions with the same polarity per page on pages with matrix input (if the *Weighted sum* calculation method is used for scoring).

Please note: Although it is possible to select individual questions on the page for scoring when using pages with matrix input and therefore also to make these selectable as a scale, the entire page with all the questions on it is always shown. Depending on the use case, it may therefore only make limited sense to define selectable scales when using pages with matrix input.

4.5.1.4 Create the results report

In the *Create results report* tab, you can customize the appearance of your report. You can add different *report elements* (*profile*, *result table*, *test protocol*, *variable description*) to your results report. At the top right of each area, you will find a symbol in the form of a question mark. If you hover over this symbol, you will see a preview of what the respective report element looks like in an example results report. Please note that this preview does not reflect your individual settings, but only provides a general idea of the appearance of the *report element*.

4.5.1.4.1 Result table

The *result table* report element displays the calculated variables in the form of a table. If you add a result table, you must first add a section to the result table and then add variables to this section. You can create different *sections* within the table, which you can label for a cleaner structure. In the example from the screenshot below, section 1 is called "Well-being" and section 2 is called "Additional information".

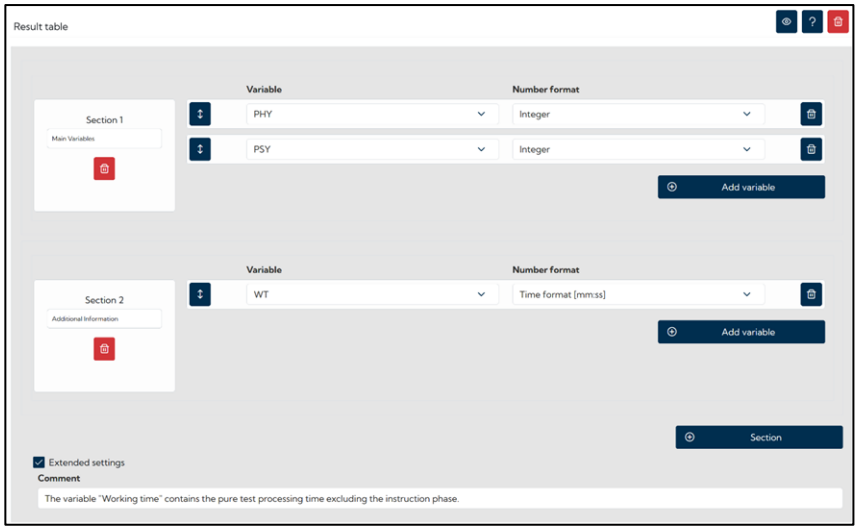
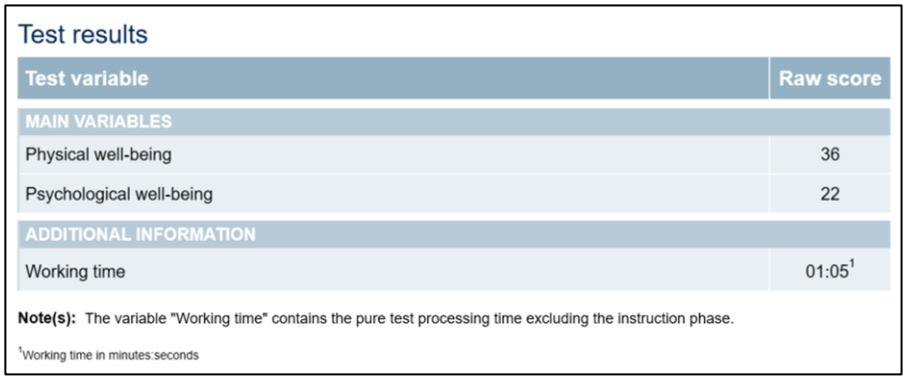


Figure 32 Example of the settings page for a result table

You can customize the display of the variable values in the table by selecting the desired number format (e.g. display as a whole number or with decimal places). You can change the order in which your variables are listed (using drag & drop on the buttons with the arrows). The screenshot below shows how this is displayed in the results report. The displayed name of the variables comes from the *Description* field on the *Set scoring* tab.



Test results

Test variable	Raw score
MAIN VARIABLES	
Physical well-being	36
Psychological well-being	22
ADDITIONAL INFORMATION	
Working time	01:05[1]

Note(s): The variable "Working time" contains the pure test processing time excluding the instruction phase.

[1]Working time in minutes:seconds

Figure 33 Example of a result table.

If necessary, you can activate the *Extended settings* and add a comment, which will be displayed in the results report as a note below the table. This can be used to provide test users with notes on certain variables.

4.5.1.4.2 Test protocol

The *test protocol* report element lists the respondent's entered answer for each test page. In addition, if test pages with correct / incorrect answer options have been defined, it is color-coded whether an answer was correct or incorrect.

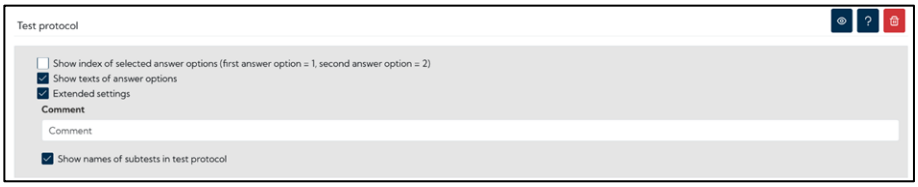
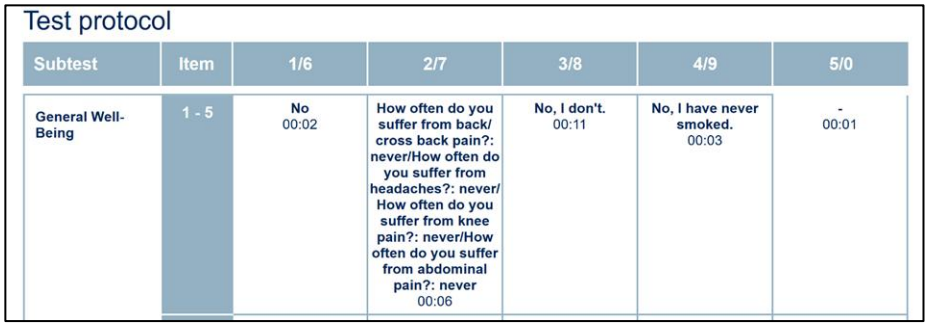


Figure 34 Example of the settings of a test protocol.

The option "*Show index of selected answer options*" allows you to display as a number which answer option was selected for each question. For example, if the first answer was selected, a 1 will be displayed.

Select "*Show answer option texts*" to display the exact text of the given answer option, regardless of whether it was selected from predefined options (e.g. multiple choice or matrix questions) or written by participants in response to open questions. If an answer option "Yes" is available on a single/multiple choice page and this is selected, this is displayed as shown in the screenshot below displayed.

In the extended settings, you can also select whether the names of the subtests should be displayed (in the example from the screenshot below, this option has been activated). You can also add a comment, which is displayed as a note under the test protocol and can, for example, provide notes on the coding of the answers.



Test protocol

Subtest	Item	1/6	2/7	3/8	4/9	5/0
General Well-Being	1 - 5	No 00:02	How often do you suffer from back/ cross back pain?: never/How often do you suffer from headaches?: never/ How often do you suffer from knee pain?: never/How often do you suffer from abdominal pain?: never 00:06	No, I don't. 00:11	No, I have never smoked. 00:03	- 00:01

Figure 35 Example of a test protocol (using the Clinical Questionnaire test template as an example).

Note: When using pages with matrix input, it is recommended that you at least use the "Index of selected answer options" option, as otherwise only a question mark symbol will be displayed in the test protocol.
For a clearer protocol in more complex tests / questionnaires (e. g when using scales) we recommend to use the item analysis protocol (see below) instead.

4.5.1.4.3 Variable description

The *variable description* report element allows you to display explanations (text descriptions) of the variables used in the test in the results report. To do this, add the variables for which you want to provide a description (*Add variable* --> select variable in the *Variable* field) and add the corresponding description in the *Variable description* field.

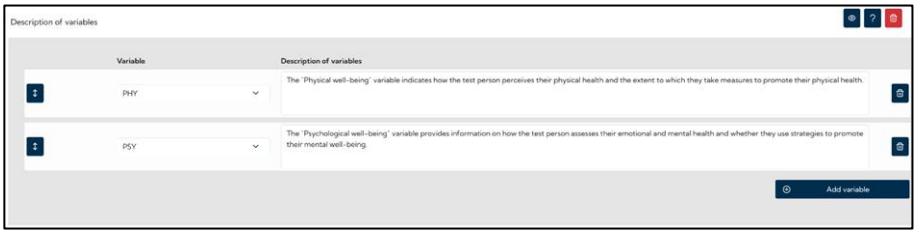


Figure 36 Example of the settings for the variable description.

The screenshot below shows how this is presented in the results report.

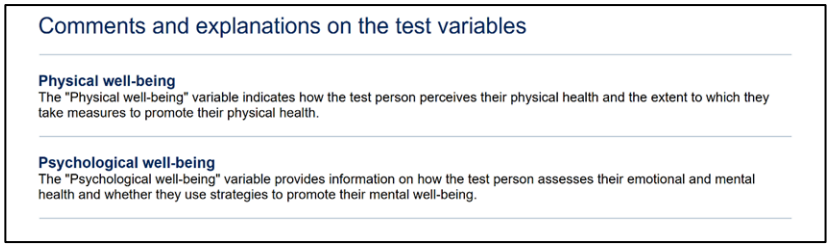


Figure 37 Example of the variable description in the results report.

4.5.1.4.4 Profile

The *profile* report element graphically displays the **norm-referenced scores** of the participants. The variable scores are arranged one below the other. A profile can be structured into *sections* with different labels.

> **Attention**: A profile can only display **norm-referenced scores**. If no norms have been added to the test, this element remains empty, even if there are raw scores available for the variables. See: (8.30-de) Normen hinzufügen on how to add norms to your test / questionnaire.

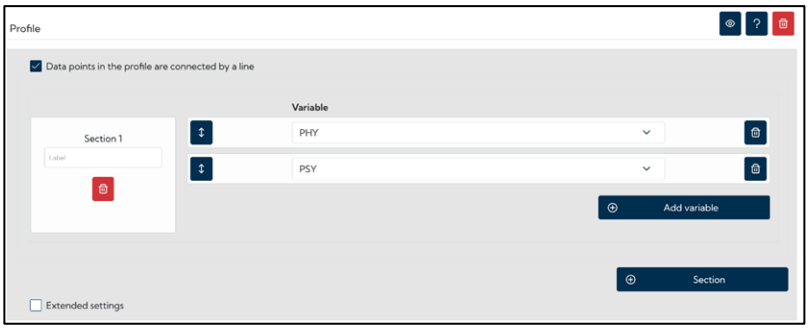


Figure 38 Example of the profile settings.

An example of how the profile is presented in the results report can be found in the screenshot below.

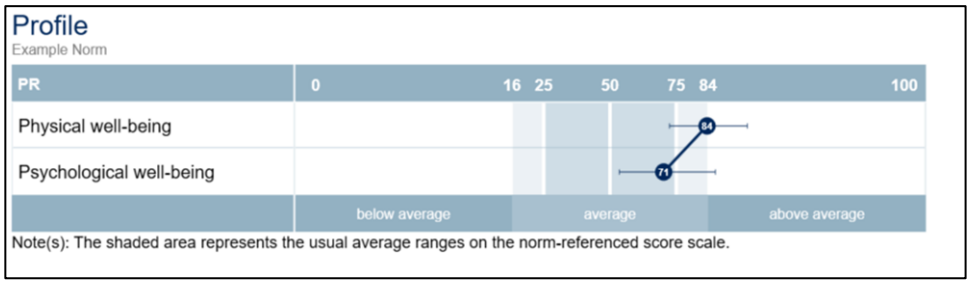


Figure 39 Example of the result display in the profile.

4.5.1.4.5 Item analysis protocol

The item analysis protocol report element offers a more detailed version of a test report. Each question is displayed in a row of a table and the selected answer option (or entered answer) is shown. The working time per page is also displayed. If the option “Display column with weights of the selected answer options” is selected in the Test Generator, the “Raw value” column is displayed, which shows the weights of the selected answer option. Weights can only be displayed if they are set under *Set scoring* (e. g. by using the *weighted sum* scoring method in one variable).

If the option “Display column with evaluation of the selected answer options” is selected, the “+/-” column is displayed in the item analysis protocol. This indicates whether the item was answered correctly (+) or incorrectly (-). This only works if answer options have also been marked as correct or incorrect.

It is also possible to specify the grouping by selecting the corresponding option in the drop-down menu. All pages of the test can be displayed in a table, a separate table can be output for each scale (if such are defined) or for each subtest (if several are used). The settings are shown as an example in Figure 31.

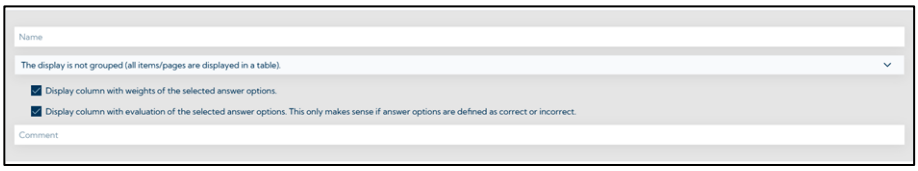


Figure 40 Example for the setting of the report element in the Test Generator.

An example of how such an item analysis protocol looks like in the results report can be found in the screenshot below.

#	Item	Answer	+/-	Raw score	Time
1	Skala A / Scale A - Frage 1 / Question 1	A		1	00:02
2	Skala A / Scale A - Frage 1 / Question 1	C		3	00:01
3	Freitext / Free text	Lorem Ipsum			00:05
4 / 1	Q1	A		1	00:01
4 / 2	Q2	B		2	00:01
4 / 3	Q3	C		3	00:01
5	Q1	Correct/Incorrect	-	1	00:02

Figure 41 Example for an item analysis protocol.

4.5.1.5 Add norms

The Test Generator can be used to add your own norms to created tests or questionnaires. The prerequisite for this is that a norm table is available. This can be calculated on the basis of existing data (e.g. calculation of percentile ranks for each possible raw score) or transferred from existing norm tables. A norm makes it possible to put the results of a test in relation to a reference sample and is the prerequisite for an unambiguous interpretation of the test result (in norm-oriented diagnostics).

To add a norm to a test, select the *Norms* option on the main page of the Test Generator in the VTS (see screenshot below).

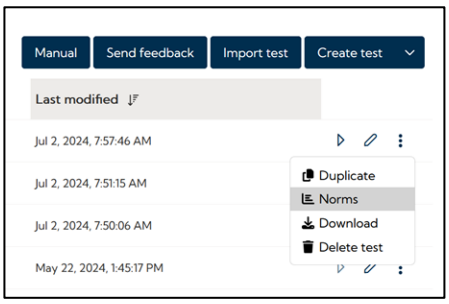


Figure 42 Open the norm editor.

The *norm editor* opens. A new norm can be added using the *Norm* button (see screenshot below).

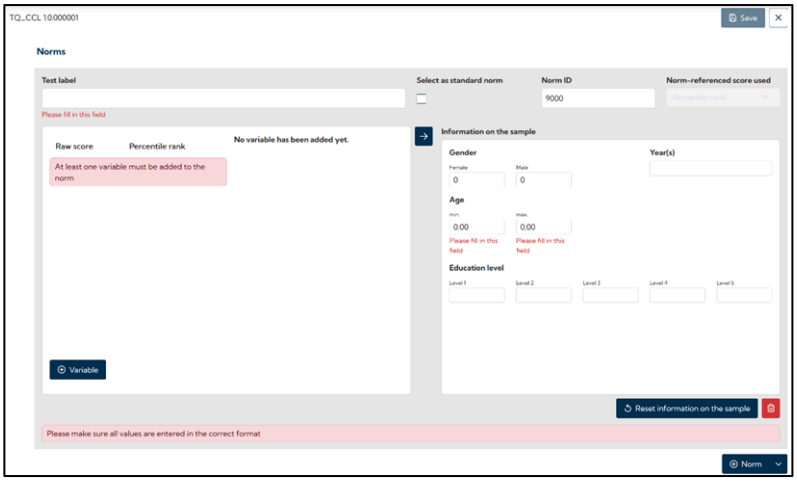


Figure 43 Norm editor of the Test Generator.

Each norm must be given a *Norm label*. This gives the norm a name and is displayed in the results report when the norm is used. It is also necessary to assign a *norm ID* (unique numbering) to each norm. If several norms are available, one norm can be *selected* as the *standard norm*, which is used for norming unless the user selects a different norm. In addition, the type of norm-referenced score can be selected in the *norm-referenced score used* field (e.g. percentile rank).

> **Attention**: Currently, only norms based on percentile ranks are supported in the norm editor. If norm-referenced scores with a different value range are used, this may result in incorrect scoring and display.

For each norm, information on the composition of the sample on the basis of which the norm-referenced scores were determined should be provided in the *sample information* section. For each norm, at least the minimum and maximum *age* of the persons in the norm sample must be stated. The format is year;month (e.g.: 14;6). In addition, the number of men and women in the sample, the year in which the sample was collected, and the distribution of education levels can be specified. The education levels follow the logic of the VTS: 1 = No school leaving certificate (less than 9 years of schooling) or special school, 2 = Compulsory schooling or intermediate secondary school completed (9-10 years of schooling), 3 = Vocational school or vocational training completed (10-12 years of training), 4 = Secondary school completed with A-levels (12-13 years of training), 5 = University or college degree.

To add norm-referenced scores, the first step is to **select the variables for which norm-referenced scores are to be added** using the *Variable* button (see Figure 35).

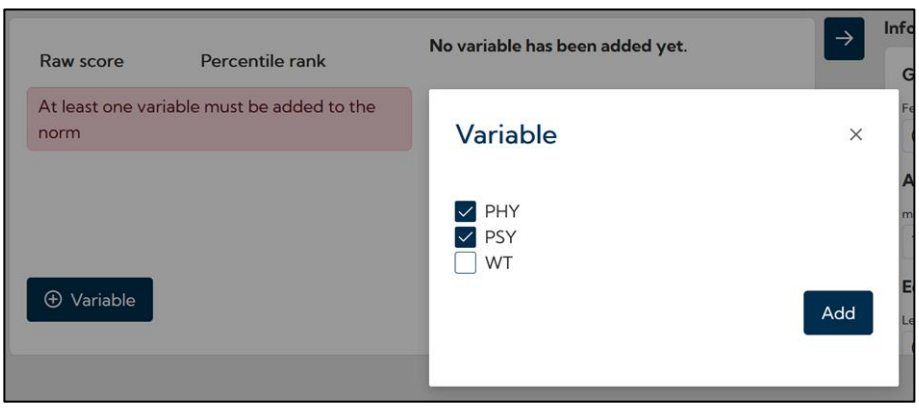


Figure 44 Selecting variables in the norm editor.

A variable can then be selected on the left-hand side of the norm editor and the raw score - norm score mapping can be entered. To do this, a row must be added to the table for each pair of values by clicking the *Add* button and then the raw score and the corresponding norm value must be entered (see screenshot below).

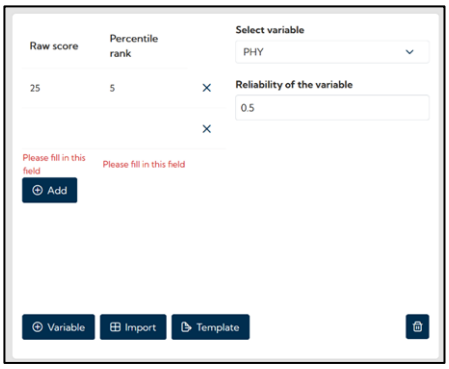


Figure 45 Manual entry of values in the norm editor.

An example of a fully entered norm can be found in the screenshot below. The raw scores that need to be entered depend on the individual settings of the test and the calculation of the variables (defines the range of values) as well as the actual empirical distribution of values in the sample on the basis of which the norm-referenced scores were determined.

The *reliability* (e.g. internal consistency) can also be specified for each variable, provided this is known. If a reliability is available for a standardized variable, confidence intervals for the norm-referenced scores are automatically output in the results report. Permitted values range from 0.01 to 0.99.

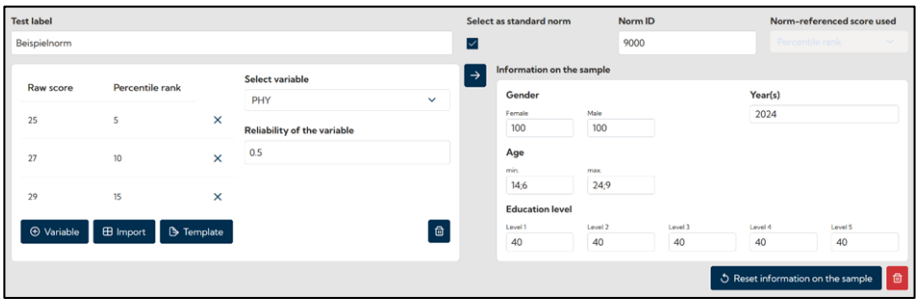


Figure 46 Example of a norm.

4.5.1.5.1 Import of norm-referenced scores via .csv file

To make it easier to add the values, especially for tests with several normed variables, the values can be imported via a .csv file. The file must correspond to a predefined format. For each variable for which values are to be imported, two columns must be included, one for the raw scores and one for the norm-referenced scores; the raw score is assigned to the norm value using the row in the file. The columns for the raw scores must be named in the format "short name of the variable|rawvalue" (e.g. PHY|rawvalue), those for the norm-referenced scores in the format "short name of the variable|normvalue" (e.g. PHY|normvalue) (see screenshot below).

PHY|rawvalue	PHY|normvalue	PSY|rawvalue	PSY|normvalue
10	15	12	18
11	20	14	20
12	25	16	22
13	30	18	24
14	35	20	26
15	40	22	28
16	45	24	30
17	50	26	32
18	55	28	34
19	60	30	36
20	65	32	38
21	70	34	40
22	75	36	42
23	80	38	44
24	85	40	46
25	90	42	48
26	95	44	50
27	100	46	52
		48	54
		50	56
		52	58

Figure 47 Example of a norm for import (.csv file).

A template of how the .csv file must be formatted can be downloaded via the *Template* button. The prerequisite for this is that all variables to be normed have been selected for norming (see above). This file can be opened in common editor programs and the raw and norm-referenced scores can be entered (see screenshot above).

Attention: The expected separator between the values is a comma. Some editor programs use a semicolon by default when files are saved as .csv. Before importing, we recommend checking the file in a text editor.

The .csv file created in this way can then be selected and imported using the *Import* button. Each import overwrites all existing values in the norms.

4.5.1.5.2 Creating norms with subgroups

It is possible to create norms with subgroups. These allow separate norms to be created and used on the basis of socio-demographic characteristics. This, for instance, allows norms to be created for specific age groups. If a person is tested and the age-specific norms are used, the appropriate age group is automatically selected as the comparison sample.

To create a norm with subgroups, select the option *Norm with subgroups* when adding a new norm. Then, in the first step, select the characteristic that was used for the creation of the norms per subgroups and then select the number of subgroups (see screenshot below).

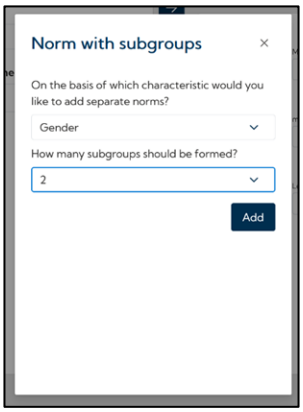


Figure 48 Selecting the characteristic for the norms with subgroups.

The norm editor now allows you to select each subgroup in the *Current subgroup* field and enter the corresponding values for each group. It is important that the information for the relevant characteristic (age, gender or education level) is entered appropriately in the *Information on the sample* field. This means that the composition of each subgroup must be specified. For instance, if the characteristic *gender* is selected, it must be specified for the group *Gender_01* whether it contains women or men. This makes it possible to implement gender-specific norms for women and men (see screenshot below).

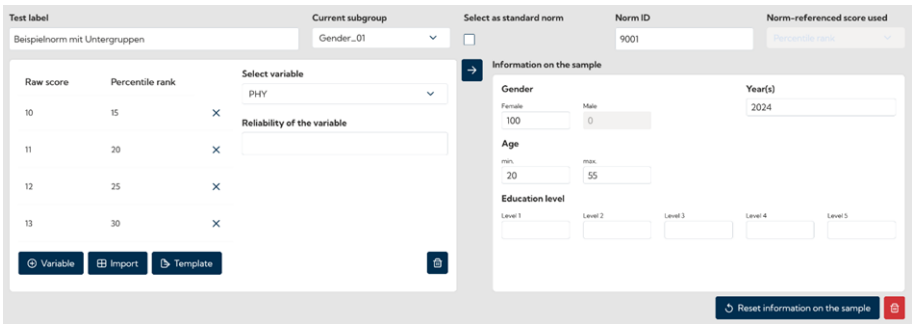


Figure 49 Example of a norm with subgroups (for the gender characteristic).

The same procedure can be used to create age-specific norms for different age groups (for example one norm for persons in the 20-40 age range and one for persons in the 41-70 age range). When creating norms for subgroups based on education level, only two groups can be created, with each group containing one or more education levels (e.g. one norm for education level 1-3 and one for education level 4-5).

The meaningful use of norms with subgroups requires that the relevant characteristics of the respondents are known and entered in the VTS (age, education level and gender).

4.5.2 Progress Monitor

The Progress Monitor is a tool that has been integrated in VTS online and offline by default since VTS 8.29. The real-time status of all planned, active and inactive testings can be displayed and monitored with this functionality. The Progress Monitor can be accessed directly in the VTS Portal via *Tools --> Progress Monitor*, without requiring any additional installation or configuration.

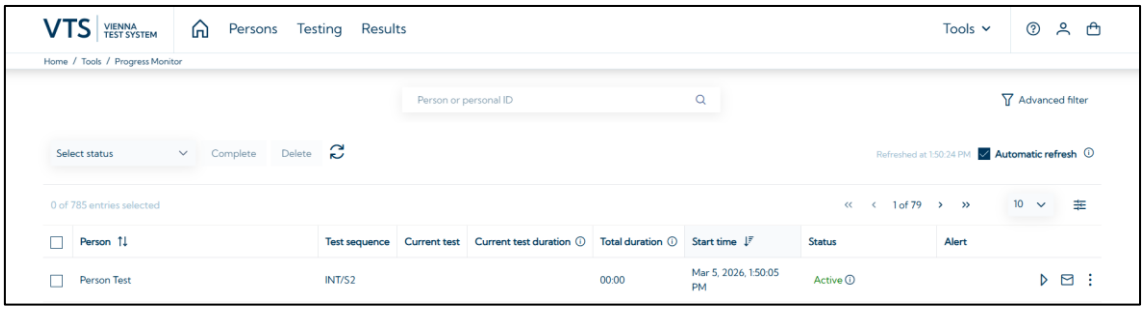


Figure 50 Progress Monitor

The Progress Monitor updates the status automatically every 30 seconds. The automatic refresh can be deactivated by clicking on the check-box next to *Automatic refresh.* If required, the dashboard can be automatically refreshed by clicking on the symbol.

Filter and search functions:

- You can search for people (or personal ID) in the search bar at the top center. Additional filters (device name, scoring code, test sequence, current test name) can be applied at the top right. In the top left corner, you can filter by test status,

for example, to monitor only active tests. A test can have the following statuses: “Not started”, “Active”, “Inactive”, “Completed”, “Skipped”

- Furthermore, for a better overview and faster search, the displayed columns (e.g., personal ID, current duration, expected duration, etc.) can be hidden or shown.

The following information **can be displayed in separate columns:**

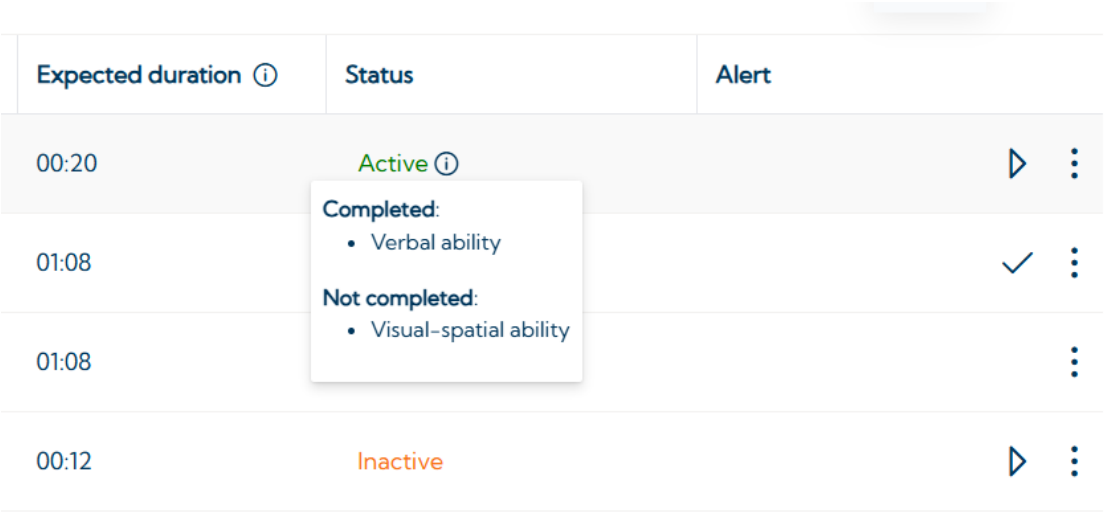
Column	Description
Person	As in "Persons / Results"
Personal ID	As in "Persons / Results"
Scoring Code	Specify additional information, such as occupation, diagnosis or reason for testing. Only provided if added manually before the testing.
Device name	PC/device name for Test Player Client; "Browser" when administered via browser
Test sequence	Name of the test sequence/test battery
Current test	Name of the currently conducted test
Phase	Current phase within the test: Instructions, Test Execution, Pause
Current test duration*	Time spent only on the current test
Total duration*	Total time for the entire test sequence/test battery
Expected duration	Estimated total duration of the testing (calculation as under *Testing*)
Estimated remaining duration	Difference: Expected Duration – Total Duration (negative sign once the total duration exceeds the expected duration)
Start time	Date and time of test start
Status	Status of the testing (Not started, Active, Inactive, Completed, Skipped)
Alert	Note if a red window is detected

*The duration is calculated from the start of the instruction phase to the end of the testing (minus any interruptions).

Start, continue or complete test:

- Testings with the status “Inactive” or “Not started” can be started or continued using the play symbol ▷. For browser-based tests, there is also the option of copying a link to continue the test on another device.
- Testings which have been completed will be visible in the Progress Monitor until the end of the day. Afterwards you can access them in the tab *Results*.
- Testings with the status “Inactive” can be completed by marking all relevant persons and pressing *Complete*. Test results are scored solely on the basis of any available interim results. Once the test is completed, no further tests or data can be added, the test cannot be continued and one license is consumed for each completed test. This process cannot be undone. Testings which are completed this way will switch to status “Skipped”.

By hovering over the ⓘ symbol next to the test status "Active", completed and not completed subtests are displayed.



4.5.3 VTS Analytics

VTS Analytics provides an interactive tool for exploring and interpreting your test results. Depending on the context in which the Vienna Test System is used, the dashboards can support different analytical goals, such as monitoring test activity, comparing individuals with reference groups, or tracking changes in cognitive performance over time.

4.5.3.1 Use Cases of VTS Analytics

The following practice examples illustrate how VTS Analytics can be used in typical professional settings. Each example demonstrates how the dashboards can support decision-making processes by combining test results with additional information such as demographic variables, measurement precision, or repeated measurements.

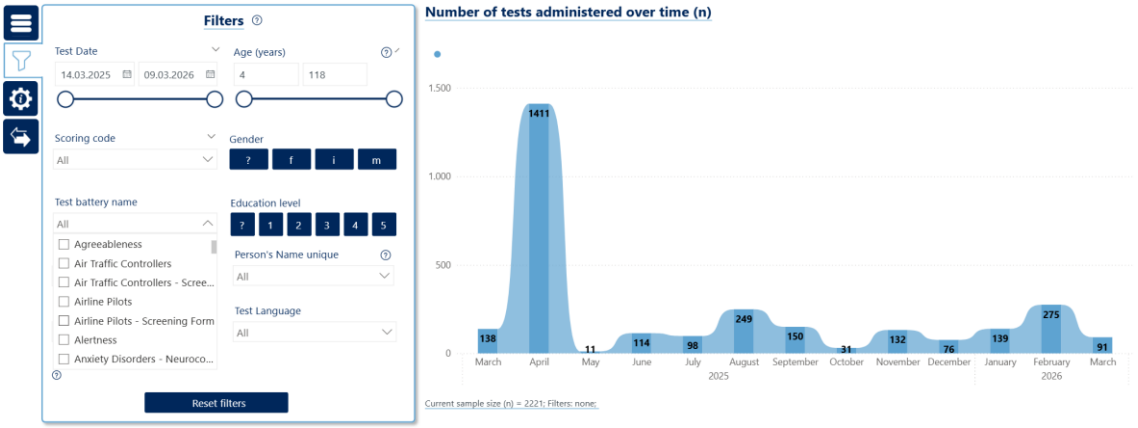
4.5.3.1.1 Application in Human Resources

This example illustrates how VTS Analytics can support the recruitment process for commercial airline pilots.

You are a psychologist working for an airline and are responsible for recruiting 20 new commercial pilots. The application period begins on October 1st and initially lasts three months. Preselected candidates are invited to complete the SFS Test Solution (8.30-en) Airline Pilots (Screening Form) as part of the online screening process.

4.5.3.1.1.1 Monitoring the Application Phase

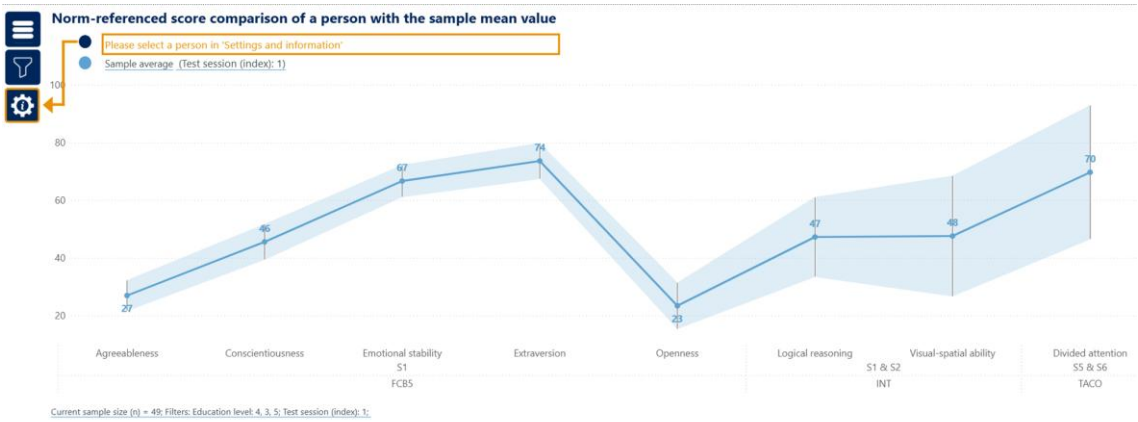
During the application period, you regularly monitor how many candidates have completed testing. To do so, you navigate to Tests - Overview in VTS Analytics and set the filters so that only results from the test battery (8.30-en) Airline Pilots (Screening Form) are included.



After two months, you observe that 49 candidates have completed the testing in VTS Online.

To better understand the performance level of the current applicant pool, you next navigate to Results - Comparison with average. After activating confidence intervals, you review the average performance across all candidates. You notice that the average score in Logical Reasoning is approximately at the population average.

Given that only candidates scoring above a cut-off of percentile rank 75 relative to the representative norm sample will be considered for the next stage, this suggests that a substantial proportion of the current applicant pool may not meet the predefined selection criterion.

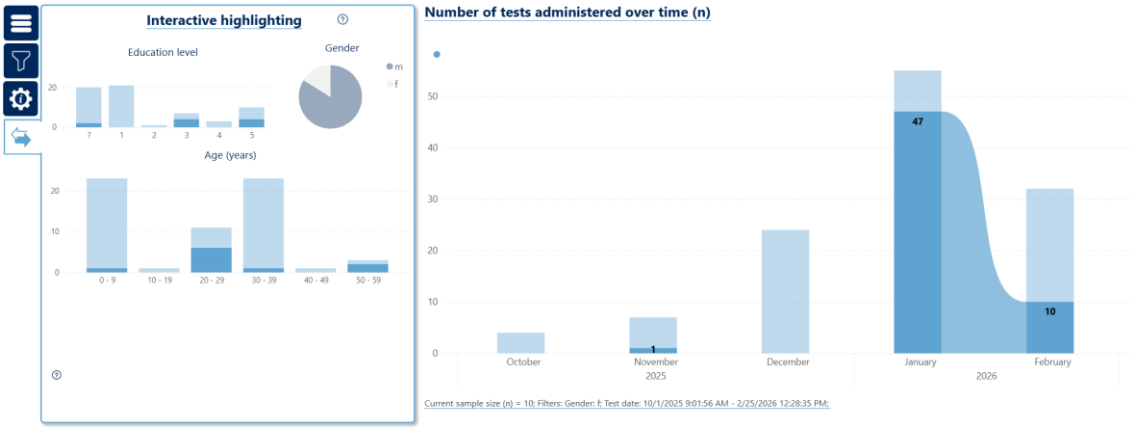


4.5.3.1.1.2 Adjusting the Recruitment Strategy (Targeted Recruitment)

Based on this observation, you decide to extend the application period by another two months in order to ensure that a sufficient number of candidates remain after the expected screening dropout rate of approximately 30%.

While reviewing the data, you also notice that only one of the applicants is a woman, resulting in a very uneven gender distribution. This may be relevant with regard to requirements for gender representation. The data may therefore serve as a basis for reviewing the current recruitment strategy and approach to the target group.

After the extended recruitment period, you review the testing data again. Using Tests - Overview, you explore the data and open Interactive Highlighting to investigate whether the targeted advertising campaign had the intended effect.



You observe that the gender composition of the applicant pool has become more balanced.

To verify this observation in more detail, you navigate to Distributions - Sample. Here you examine the distributions of gender, age, and education level within the applicant sample.

4.5.3.1.1.3 Preparing and Evaluating the On-Site Assessment

Before proceeding with the selection process, you also examine the data for possible irregularities. On the Distributions - Distributions page, you use cross-highlighting to compare test duration with the distribution of test scores.

This analysis reveals one candidate who consistently achieved maximum scores while also showing one of the shortest test durations. To investigate further, you open the candidate's detailed test results in VTS Online and review their item-level performance. You notice that the working time per page is consistently five seconds, which suggests that the test may not have been completed under valid conditions. You therefore decide to address this observation during the candidate's in-person interview.

At the end of the recruitment phase, you have 100 applicants, 58 of whom are women. These candidates are invited to participate in the on-site assessment, which includes the SFS Test Solution (8.30-en) Airline Pilots (Standard Form) as well as a structured in-person interview.

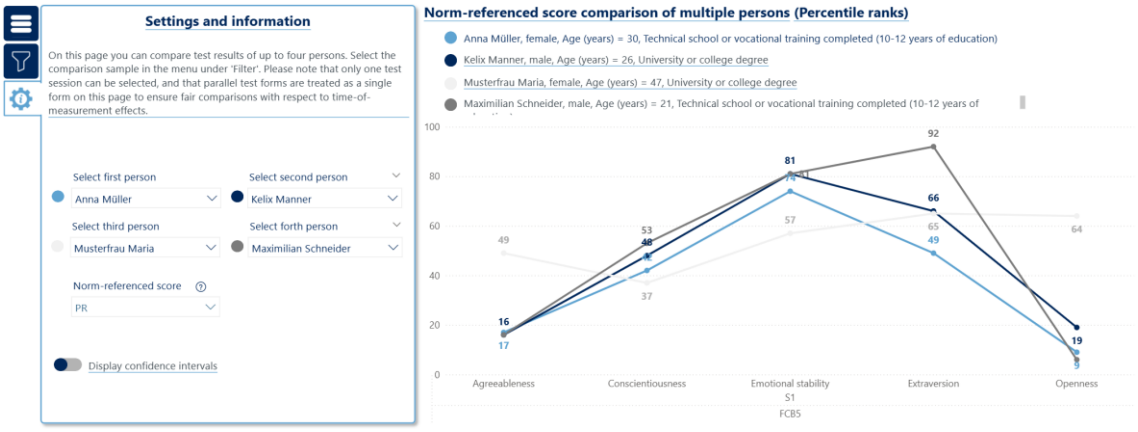
After the on-site testing has been completed, you analyze the results in VTS Analytics. By navigating to Tests - Overview and filtering the data for the test battery (8.30-en) Airline Pilots (Standard Form) and the relevant on-site testing dates, you observe a response rate of 70%.

To identify candidates who meet the minimum cognitive requirements, you navigate to Results - Overview and sort the results by Logical Reasoning. You then determine which candidates achieved a norm-referenced score above percentile rank 75. This results in 32 candidates who meet the predefined cutoff. Using the Filters panel, you select these individuals via Person name (unique) in order to review the final candidate pool.

4.5.3.1.1.4 Preparing the Final Interviews

Before making final decisions, you verify the demographic composition of the selected candidates using Distributions - Sample. The final pool consists of 17 women and 14 men, and all candidates meet the predefined requirements for education level and age.

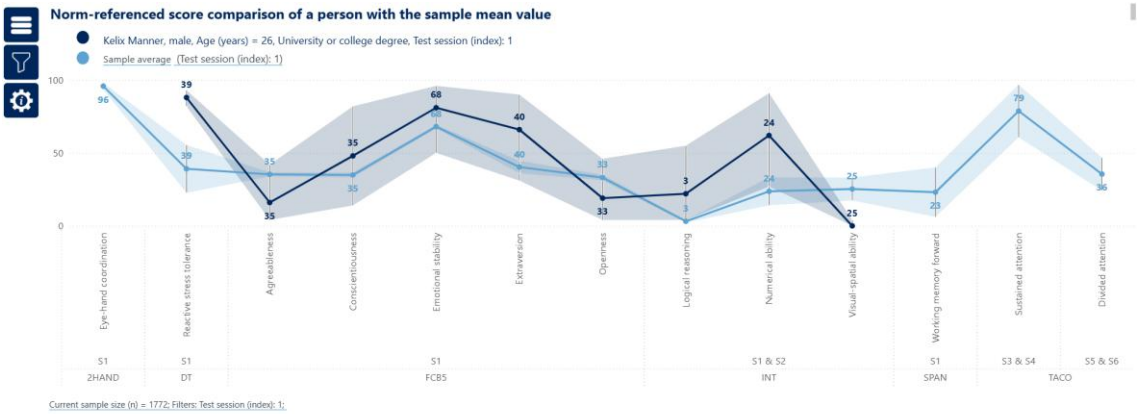
To obtain a clearer picture of each candidate's performance profile, you open Results - Comparison with average . By filtering for gender and selecting individual candidates in the Settings panel, you can compare each candidate's results with the average performance of their respective gender group.



After gaining a more detailed understanding of each candidate's strengths and weaknesses, you proceed to Results - Comparison of persons to directly compare the top candidates across multiple psychological traits.

For the final interviews, you prepare an overview of each candidate's performance relative to the sample average of their gender group using Results - Comparison with average again. This allows you to quickly assess how each candidate's psychological traits compare with the reference group.

Abilities are interpreted using confidence intervals, taking test reliability into account. In this context, a candidate's ability can be considered above average when the individual confidence interval overlaps with the sample mean confidence interval.



In the example shown, the candidate demonstrates above-average reactive stress tolerance, while their visuo-spatial ability falls below the sample average. The comparisons are based on T-scores - norm-referenced score type can be set under "Settings" - ensure statistically appropriate calculations of the sample mean and allow reliable comparisons between candidates.

4.5.3.1.2 Clinical application

This example illustrates how VTS Analytics can support cognitive rehabilitation and longitudinal monitoring of patients.

You are a neuropsychologist working in a vocational rehabilitation center that focuses on cognitive rehabilitation following stroke, traumatic brain injury, or substance use disorder. To assess the neurocognitive level of functioning, you use the SFS Test Solutions (8.30-en) Substance Use Disorders - Neurocognitive Assessment and (8.30-en) Brief Neurocognitive Assessment as a basic screening of neurocognitive domains. Depending on the patient's anamnesis, you may add additional tests to further assess specific cognitive functions.

The individual cognitive profile of a patient can already be reviewed in the test result report. However, you decide to use VTS Analytics to compare the patient's results not only with the normative reference population but also with the average performance of patients with the same diagnosis in your clinic.

To enable this comparison, you enter the diagnosis code as a Scoring Code during data collection.

4.5.3.1.2.1 Comparing the Patient with the Clinical Sample

After testing, you open Results - Comparison with average in VTS Analytics. In the Settings panel, you select the individual patient whose results you want to analyze.

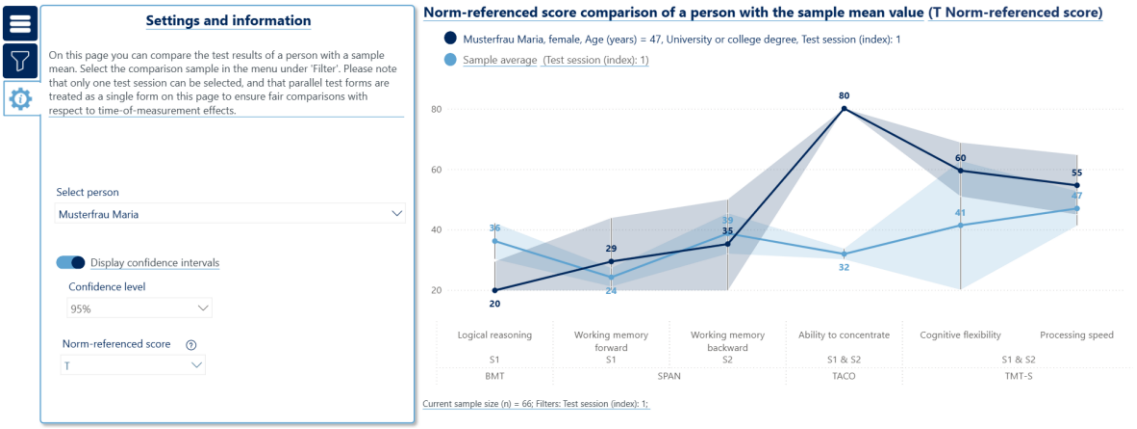
Next, you restrict the comparison sample by applying filters. Under Filters, you limit the dataset to:

- patients from your clinic
- the relevant demographic group

- the corresponding diagnosis group

You then activate Show confidence intervals in the Settings panel and select T-scores as the norm-referenced score metric. T-scores are normally distributed with a mean of 50 and a standard deviation of 10, which allows for appropriate statistical comparison between an individual and a sample average.

The results are shared with the physicians and psychologists involved in the patient's therapy. This allows them to see how the patient performs not only relative to the norm population, but also relative to the clinical population typically treated in the center. such comparisons provide therapists with clinically relevant reference points for their everyday clinical work.



The analysis shows that the patient performs two standard deviations below the norm population mean in short-term memory (SPAN S1). However, compared with the clinic's typical patient population, the patient performs slightly above the average level. The difference is not statistically significant when taking into account the sample size and test reliability.

In logical reasoning, the patient performs three standard deviations below the norm population mean, which is also below the clinic's average performance for patients with the same diagnosis. In this case, the difference is statistically significant, as the confidence intervals do not overlap.

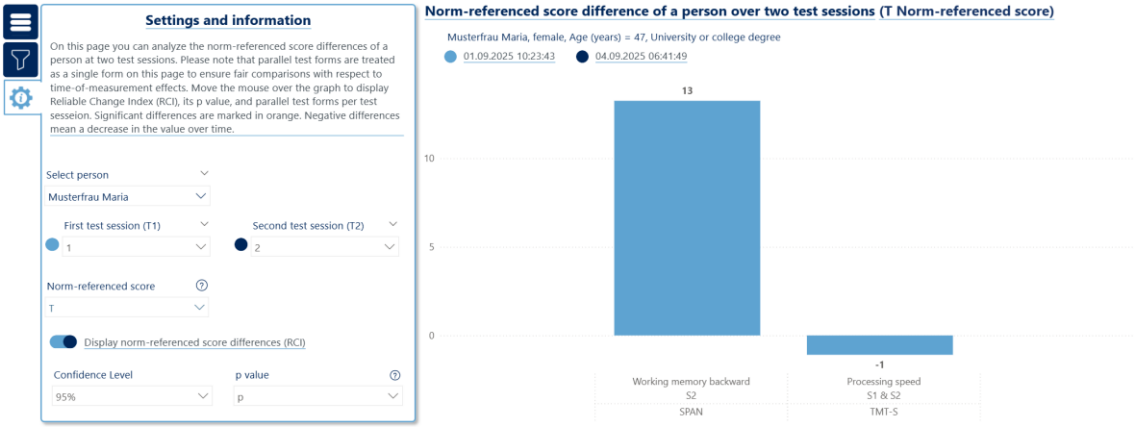
At the same time, the patient shows clear cognitive strengths. Their ability to concentrate and processing speed are above average, and cognitive flexibility appears largely unaffected. These findings provide valuable information for tailoring an individualized cognitive rehabilitation plan.

4.5.3.1.2.2 Monitoring Cognitive Progress Over Time

After some time in therapy, the patient is tested again to monitor possible improvements.

To evaluate changes in performance, you open Results - Comparison over time in VTS Analytics and again select the patient in question. At this stage, the patient has completed follow-up testing for working memory and processing speed.

To determine whether the observed changes are statistically meaningful, you activate Display norm-referenced score differences (RCI). This option calculates the Reliable Change Index (RCI), which takes the reliability of the test into account.



At a significance level of 95% with one-sided testing (testing specifically for improvement), the observed improvement of 13 T-score points does not yet reach statistical significance.

By hovering over the graph, you can directly inspect the values for:

- norm-referenced score at time 1 (admission)
- norm-referenced score at time 2 (monitoring)
- the difference between the scores
- the Reliable Change Index

At the time of discharge, the patient completes the full cognitive test battery again.

Using Results - Comparison over time, you compare the results from time 1 (admission) with time 3 (release). This allows you to quickly obtain the reliable change indices, score differences, and norm-referenced values across all cognitive variables.

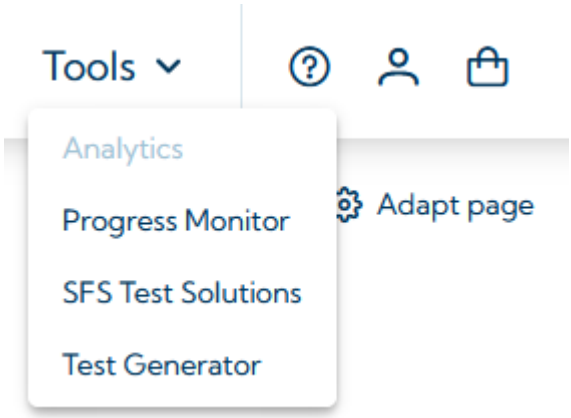
These results provide an objective basis for evaluating the patient's cognitive recovery during rehabilitation and can be included in the final clinical documentation.

4.5.3.2 Using VTS Analytics

4.5.3.2.1 Getting started

> VTS Analytics is currently free of charge and available to all users of VTS Online.

You can find VTS Analytis in VTS Online at the top right under "Tools" → "Analytics"



Your test results are exported to VTS Analytics data storage automatically (within the limitations, see: (8.30-en) Limitations & FAQ#Limiations).

> Deleting a test result in VTS Online also removes the corresponding record from VTS Analytics.

Data export to VTS Analytics runs every hour on workdays between 07:00 and 23:00 UTC. Because of this update cycle, it may take up to 60 minutes for newly completed testings to appear in the analytics dashboards. You can check the time of the latest data update directly in the Tests section of VTS Analytics: Tests - Overview.

4.5.3.2.2 Interface Overview

The VTS Analytics interface can be accessed from the left-hand side menu, which is available on all pages of the dashboard.

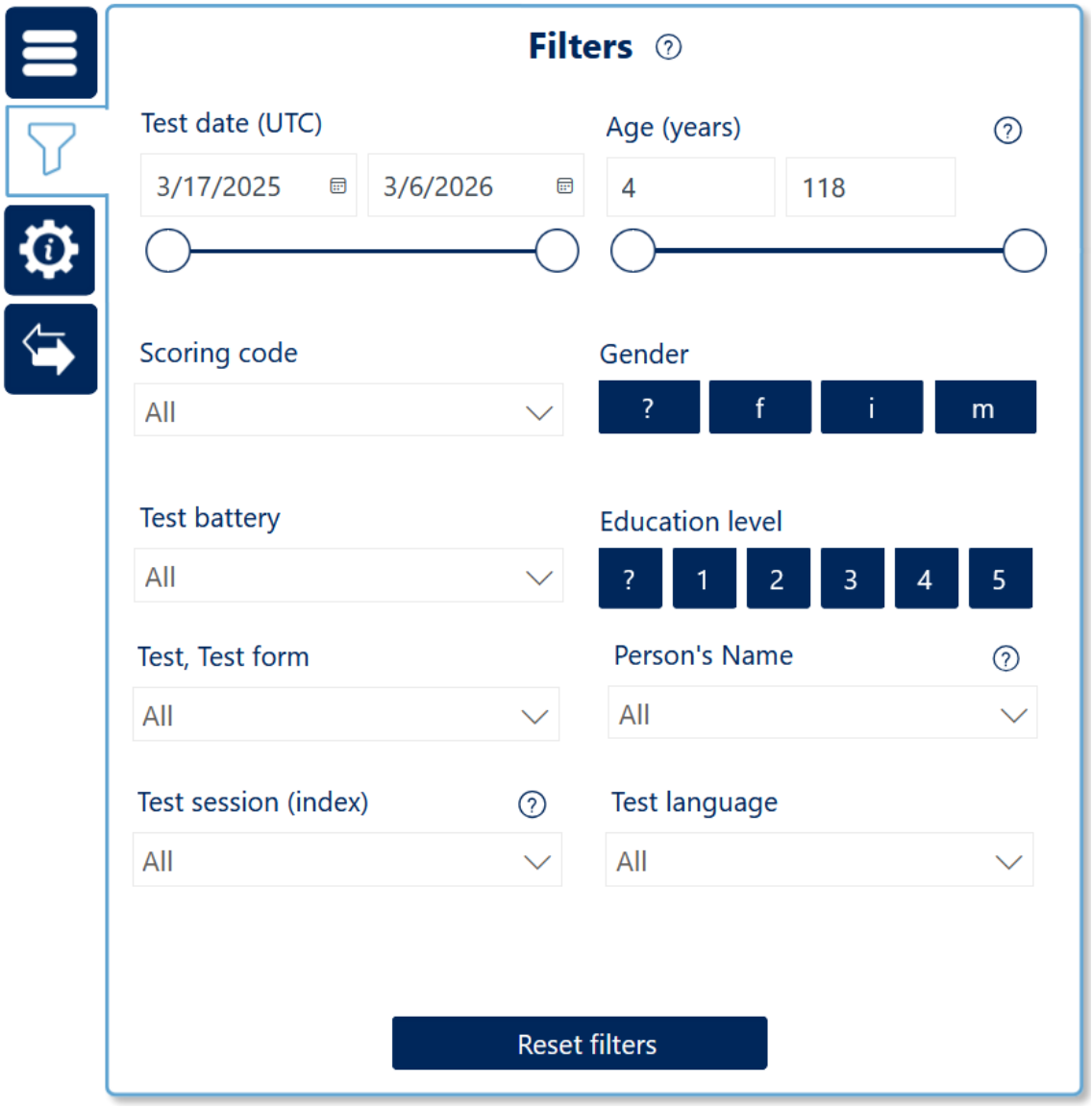
> You can **minimize the side panels** by pressing the respective menu button again. This allows you to maximize the available visualization area.

4.5.3.2.2.1 Navigation

The Navigation menu allows you to move between the different pages of VTS Analytics.

You can also use it to return to the starting page at any time.

4.5.3.2.2.2 Filters



The Filters menu allows you to define which test results are included in your analysis. The selected filters determine which data are displayed across all pages of VTS Analytics.

The following filter variables are available:

- Test Date: Filters results based on the date on which the test result was created.
- Scoring Code: A custom string that can be assigned to each test person in VTS Online.
- Test Battery Name: The name of the test battery or the SFS Test Solution used.
- Test / Test Form: The specific test procedure and the test form used.
- Test session (index): Indicates the sequence of repeated test administrations for a person. Each time a person completes a test, the session number increases, regardless of whether a parallel test form is used. Example: If a person completes TMT-S test form S1 and later TMT-S test form S2, these results are counted as test session 1 and test session 2.

- Age (years): The age of the test person at the time of testing. If test results span multiple years, each result is associated with the age at the respective test date.
- Gender
- Education Level
    - 1 – Compulsory schooling not completed (less than 9 years of school) or special school
    - 2 – Compulsory schooling or immediate secondary school completed (9–10 years of schooling)
    - 3 – Technical school or vocational training completed (10–12 years of education)
    - 4 – High school graduation with university entrance qualification (12–13 years of schooling)
    - 5 – University or college degree
    - ? – Education level unknown
- Person's Name: If multiple persons share the same name, they are distinguished using gender, age, and the system ID.
- Test Language

Filters apply to all pages of VTS Analytics. If you change a filter selection:
- the visible data change on every page
- the available persons in Settings are updated
- the calculated sample statistics are recalculated

Resetting the filters also applies globally across the dashboard.

4.5.3.2.2.3 Settings and information

The Settings and Information panel allows you to configure page-specific options.

Each page typically contains:

- a description of the page's purpose
- configurable analysis settings
- additional tables that can be used for filtering or cross-highlighting

Some pages require mandatory settings before data can be displayed. In such cases, the interface guides you with orange arrows and highlighted elements. For example, on the Results - Comparison of persons page, at least one person must be selected before the visualization can display data.

4.5.3.2.2.4 Interactive highlighting

Some pages support interactive highlighting, which allows you to explore relationships within the data without applying filters.

Instead of restricting the dataset, interactive highlighting temporarily emphasizes the selected data points in other visualizations on the page. For example, on the Tests - Overview page you can select elements within a chart to highlight related data in other charts.

You can **select multiple values simultaneously** by holding **Ctrl + Left Click** while selecting additional elements.

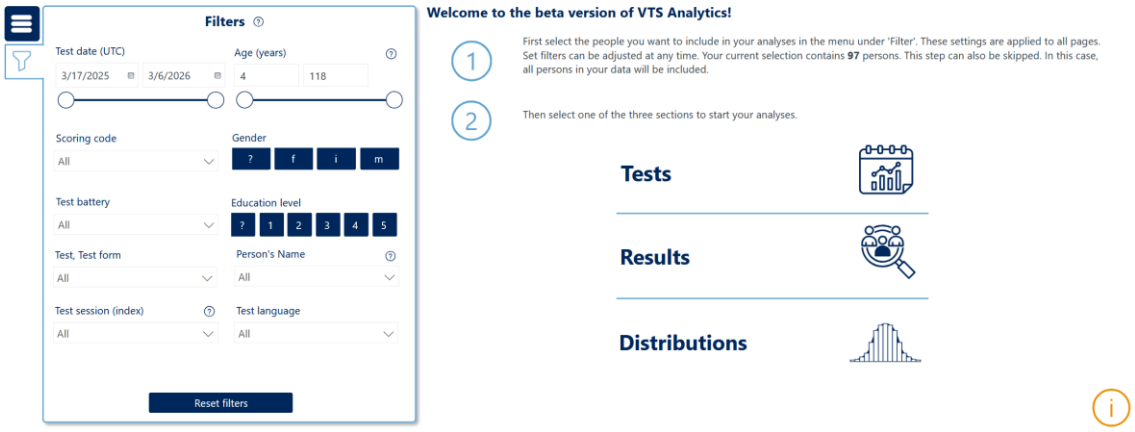
4.5.3.2.3 Sections and Pages

Here you find all pages of the VTS Analyitics dashboard. The pages are organized in **sections**:

- Tests
- Results
- Distributions

4.5.3.2.3.1 About VTS Analytics

This is the landing page of VTS Analytics. You can hover your mouse over the info button ⓘ to see the version info and limitations.

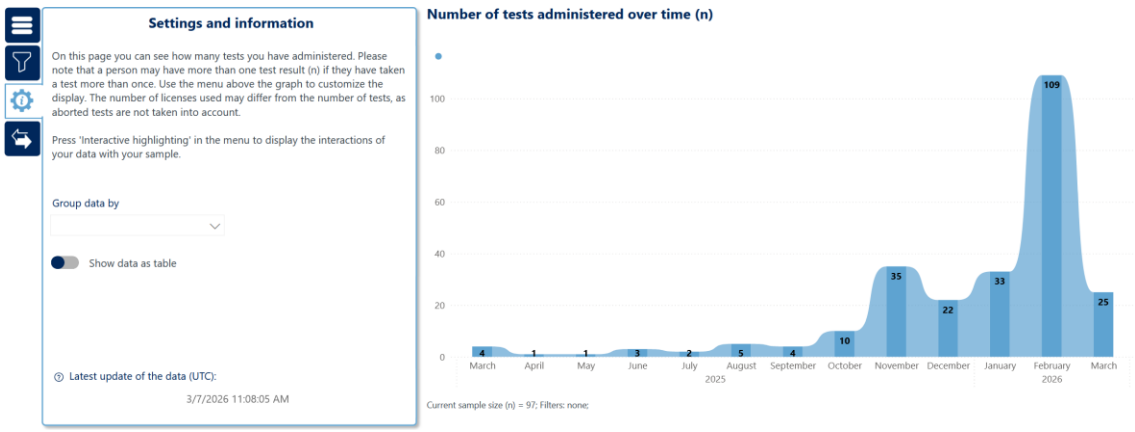


4.5.3.2.3.2 Tests - Overview

On this page you can monitor how much you're testing. Use the "Group data by" dropdown and "Show as table" toggle to adjust the visual.

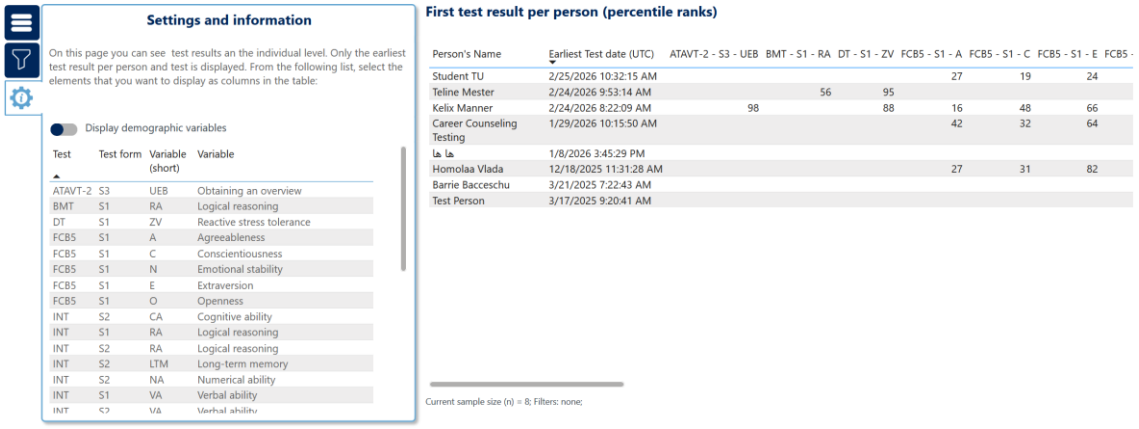
Interactive highlighting ( ) is available on this page.

Also, you can find the latest data update of the data processing from VTS Online on this page.



4.5.3.2.3.3 Results - Overview

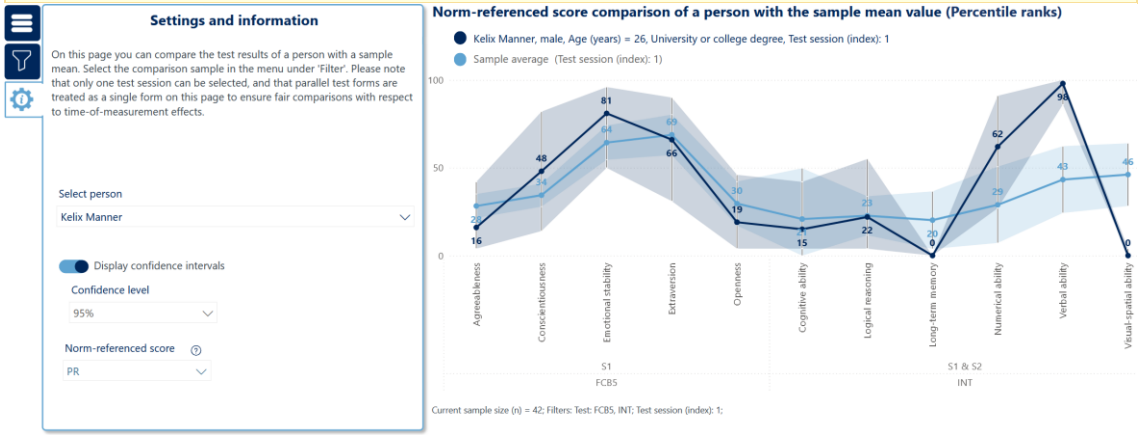
On this page, you can see the first test result of each person. By clicking on the table in “Settings and information” you can dynamically cross-filter the visual. Use “Display demographic variables” to add Gender, Age, and Education to the table.



4.5.3.2.3.4 Results - Comparison with average

On this page, you can compare a test person to a sample mean. The sample mean can be set irrespective if the person is part of that sample (e. g. compare a women to a men-only sample mean).

> You have to select one person in “Settings and information” to display person-level data.



4.5.3.2.3.4.1 Confidence interval of the sample mean

The confidence interval of the sample mean is calculated as

$$CI = \bar{x} \pm z \cdot \frac{\sigma}{\sqrt{n}}$$

where

- *x* is the sample mean
- *z* is the critical value corresponding to the selected confidence level
- *σ* is the standard deviation
- *n* is the sample size

If $n < 3$, the confidence interval is not displayed.

The user chooses *z* from the available confidence levels:

Confidence level	z	α
68%	1.000	0.32
80%	1.282	0.20
90%	1.645	0.10
95% (default)	1.960	0.05
99%	2.576	0.01

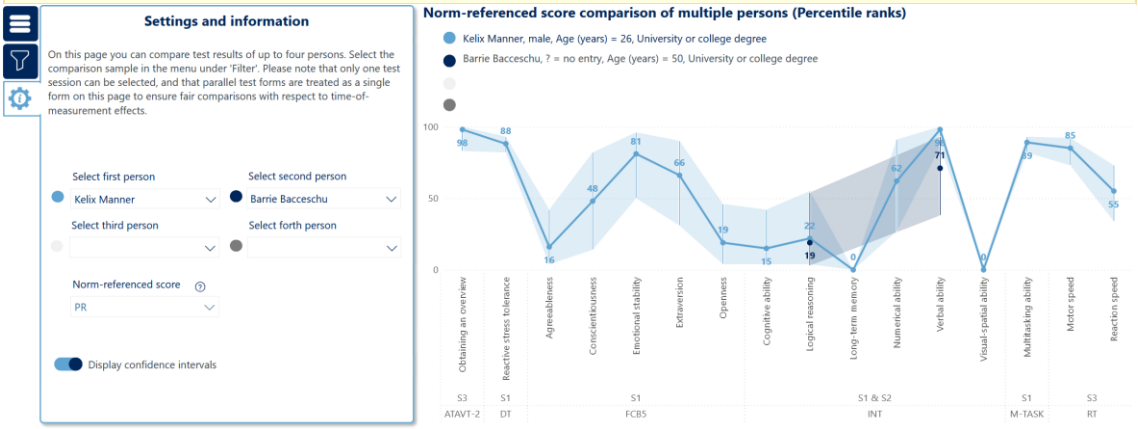
The bounds of the norm-referenced score confidence intervals are restricted depending on the score type, for percentile ranks $0 \leq CI \leq 100$, and for T scores, IQ scores, and *Z* scores $-3\sigma \leq CI \leq +3\sigma$ with

Score scale	Mean (μ)	Standard deviation (σ)
Z score	100	10
T score	50	10
IQ score	100	15

4.5.3.2.3.5 Results - Comparison of persons

On this page you can compare test results of different persons with each other.

You have to select one person in “Settings and information” in order for data to be displayed.



4.5.3.2.3.5.1 Norm-referenced score confidence interval scaling

The resulting lower and upper bounds of the norm-referenced score confidence interval are then scaled based on *zα* value chosen:

Using the formulas

$$CI_{\text{lower}} = X - z_{\alpha} \cdot \frac{X - CI_{\text{lower}}^{95\%}}{1.96}$$

$$CI_{\text{upper}} = X + z_{\alpha} \cdot \frac{CI^{95\%}_{\text{upper}} - X}{1.96}$$

where

- X is the observed score at the respective test session in the selected score scale
- $CI^{95\%}_{\text{lower}}$ and $CI^{95\%}_{\text{upper}}$ confidence bounds in the selected score scale
- 1.96 is the critical value for a 95% confidence interval
- zα is the critical value corresponding to the confidence level selected in VTS Analytics

This means that the width of the exported 95% confidence interval is proportionally adjusted to match the selected confidence level.

4.5.3.2.3.6 Results - Comparison over time

On this page, you can compare test results of the same test person over time at different times of measurement. Confidence intervals are based on test reliability (see also Results - Comparison of persons).

> You have to select one person in “Settings and information” with two test sessions in order for data to be displayed.

When pressing “Display norm-referenced score differences (RCI)”, you are redirected to a page where you can look at the respective *differences* of the values viewed in the previous page. Calculations are described below.

4.5.3.2.3.6.1 Calculation of the Reliable Change Index (RCI)

The Reliable Change Index is used to determine whether the change in a person's test score between two test sessions exceeds what would be expected based on measurement error:

$$RCI = \frac{Z_2 - Z_1}{\sqrt{SEM_1^2 + SEM_2^2}}$$

where

- *Z1* = standardized score (z-score) at time point 1
- *Z2* = standardized score (z-score) at time point 2
- *SEM1* = standard error of measurement at time point 1
- *SEM2* = standard error of measurement at time point 2

The standard error of measurement is derived from the 95% confidence interval of the test score exported from VTS Online

$$SEM = \frac{CI_{upper} - CI_{lower}}{2 \cdot 1.96}$$

where lower and upper bound of the 95% confidence interval are Z values, irrespective of the norm-referenced score type chosen by the user, which is only used to display the absolute norm-referenced score differences.

The selected confidence level and hypothesis type (one or two-sided) determine only the significance threshold *p*crit for visualization:

$$\alpha = 1 - \text{Confidence Level}, \quad p_{\text{crit}} = \begin{cases} \alpha & \text{(one-sided)} \\ \alpha/2 & \text{(two-sided)} \end{cases}$$

Changes are classified as significant if $p < p\text{crit}$ and not significant if $p \geq p\text{crit}$ This affects only the color of the bar (orange = significant, blue = not significant) and does not change the RCI calculation itself.

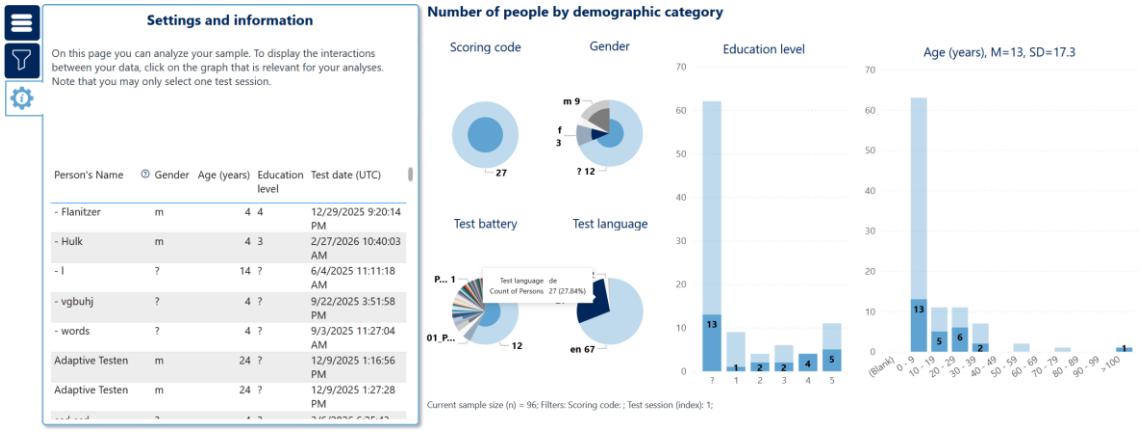
The p-value is calculated from the RCI assuming that the RCI follows an approximately standard normal distribution under the null hypothesis of no change:

$$p_{\text{one-sided}} = \begin{cases} 1 - \Phi(RCI), & RCI > 0 \\ \Phi(RCI), & RCI \leq 0 \end{cases}$$

$$p_{\text{two-sided}} = 2\left(1 - \Phi(|RCI|)\right)$$

4.5.3.2.3.7 Distributions - Sample

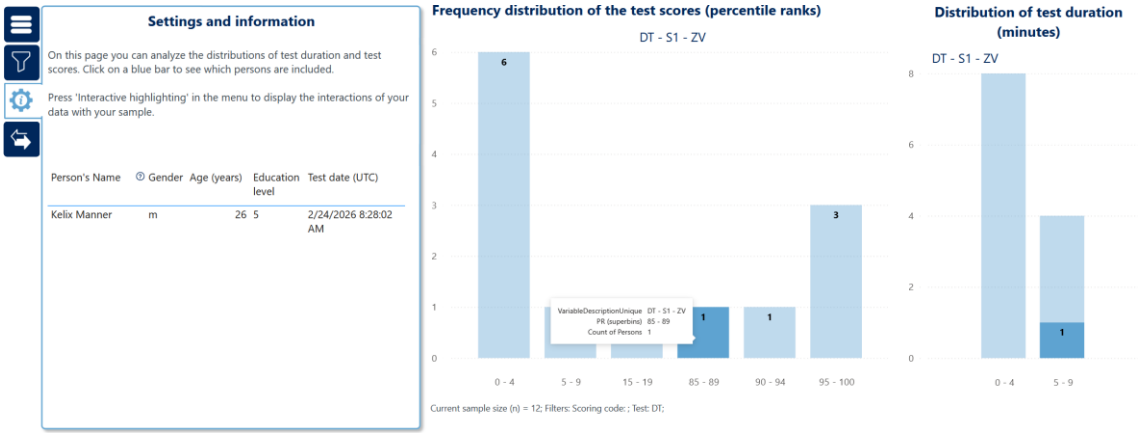
On this page, you can analyze the demographic characteristics of your sample, and which test persons belong to which group.



4.5.3.2.3.8 Distributions - Distributions

On this page, you can investigate your test score and test duration distributions and how they interact.

Interactive highlighting ( ) is available on this page.



4.5.3.3 Limitations & FAQ

4.5.3.3.1 Limiations

VTS Analytics is available in **English and German**. If VTS Online is set to another language, VTS Analytics will automatically be displayed in English.
VTS Analytics currently only supports **SCHUHFRIED Selection tests**. Data from other tests as well as tests created with Test Generator and open access tests cannot be considered for your analysis.
VTS Analytics is currently only available for **VTS Online**.

4.5.3.3.2 FAQ

Q: Is VTS Analytics free to use?

A: VTS Analytics is currently available free of charge. As soon as this functionality of the VTS online becomes chargeable, we ask you to purchase a license for further use.

Q: Who can access VTS Analytics?

A: Users who have access to VTS Online and sufficient permissions for the respective environment can access VTS Analytics.

Q: Why do I not see my test results in VTS Analytics?

A: Possible reasons include:

- The test result was created before the release of VTS 8.27 on August 2024.
- The test type is not supported by VTS Analytics (only SCHUHFRIED Selection tests).
- The data export cycle has not yet completed (exports run once per hour).

Q: How long does it take until new test results appear?

A: Data is exported to VTS Analytics every hour on workdays between 07:00 and 23:00 UTC.
New results may therefore take up to 60 minutes to appear in the dashboards.

Q: What happens if I delete a test result in VTS Online?

A: If a test result is deleted in VTS Online, it is also removed from VTS Analytics.

Q: Can I analyze historical test results created offline or before 2024?

A: No. Only test results generated after the release of VTS Online 8.27 in August 2024 are available.

Q: Can I analyze custom test batteries?

A: Yes, as long as they consist of supported tests (SCHUHFRIED Selection).

Q: Why does my sample size change when I switch pages?

A: The person may be excluded by the currently active filters.

Q: Why can I not select a person in the Settings panel?

A: The persons available in “Settings” are affected by active filters. Try resetting all filters.

Q: Can I save filter settings?

A: Currently, filter selections are session-based and may reset when the dashboard is reloaded.

Q: What does cross-highlighting mean?

A: Cross-highlighting allows you to select elements in one visualization and highlight the corresponding data in other visualizations on the same page. You can select multiple elements at once using Ctrl + Left Click.

Q: Why do some pages not display data?

A: Some pages require mandatory selections, such as choosing at least one person to display comparisons. If the issue persists, try resetting all filters.

Q: Why are some confidence intervals of the mean not displayed?

A: Confidence intervals may not be displayed if the sample size is too small.

Q: Is my data anonymized when processed in VTS Analytics?

A: No. Since the data is only visible within your mandant with sufficient user rights, test person name are visible in clear text.

Q: How can I export data from VTS Analytics?

A: Most tables and visualizations in VTS Analytics support the native Power BI export function. To export the displayed data, open the More options menu (⋯) in the top right corner of the visual and select Export data. The data can then be downloaded as a .csv file.

Note that the exported data reflects the currently active filters and selections in the dashboard.

4.6 Open access tests

4.6.1 Overview

In the VTS, selected open-access tests are available for free use. The included instruments originate from the scientific community and are either published under a Creative Commons license or are in the public domain.

Currently the instruments cover the following disorders, trait domains, and symptoms:

- Alcohol-related disorders
- Anxiety symptoms
- Depressive symptoms
- Maladaptive personality traits
- Substance-related disorders

In the VTS open-access tests are currently **only available in German** (although for some tests other translations might be available online).

4.6.2 Usage conditions & responsibility

4.6.2.1 Licensing & use

All open-access tests can be used free of charge within the VTS. Use is granted via a time-based license with a duration of 1 year, which can be obtained and renewed free of charge in the SCHUHFRIED Marketplace.

4.6.2.2 Support & responsibility

- The open-access tests are merely provided by SCHUHFRIED without any content-related or technical support.
- SCHUHFRIED assumes no responsibility for the content of the provided tests.
- No assistance is provided for content-related, methodological, diagnostic, or technical questions.
- No guarantee is given regarding the currency, completeness, or suitability of the content.

4.6.2.3 Authorship & further information

All information on authorship, original sources, and licensing of each test is documented on this page.

For further professional, scientific, content-related or technical questions, please contact the original authors or publishers of the respective instruments directly.

4.6.2.4 Notice

Responsibility for proper professional application, interpretation, and use of the open-access tests lies entirely with the users. National guidelines, legal frameworks, and professional regulations must be observed independently.

4.6.3 Currently available open-access tests

4.6.3.1 AUDIT

Full name: Alcohol Use Disorders Identification Test
Disorder area: Alcohol-related disorders
Description: WHO-certified screening test for assessing risky and harmful alcohol use
License: Public domain; freely useable according to the original authors' terms
For further information: Contact the original authors and/or refer to the pubilcations below
Note: No content-related or technical support provided by SCHUHFRIED
Reference list:

Original literature:
Saunders, J. B., Aasland, O. G., Babor, T. F., De La Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption-II. *Addiction*, *88*(6), 791–804. https://doi.org/10.1111/j.1360-0443.1993.tb02093.x
Scoring:
Berman, A. H., Wennberg, P., & Källmén, H. (2017). AUDIT & DUDIT – identifiera problem med alkohol och droger (2. Aufl.). Gothia Fortbildning. [English version used]
Integrated version obtained from: https://auditscreen.org/translations/

4.6.3.2 DUDIT

Full name: Drug Use Disorders Identification Test
Disorder area: Substance-related disorders
Description: Screening test for assessing problematic drug use
License: Public domain; freely usable according to the original authors' terms
For further information: Contact the original authors and/or refer to the pubilcations below
Note: No content-related or technical support provided by SCHUHFRIED
Reference list:

Original literature:
Berman, A. H., Bergman, H., Palmstierna, T., & Schlyter, F. (2005). Evaluation of the Drug Use Disorders Identification Test (DUDIT) in Criminal Justice and Detoxification Settings and in a Swedish Population Sample. *European Addiction Research,* *11*(1), 22-31. https://doi.org/10.1159/000081413
Scoring:
Berman, A. H., Wennberg, P., & Källmén, H. (2017). AUDIT & DUDIT – identifiera problem med alkohol och droger (2. Aufl.). Gothia Fortbildning. [English version used]
Integrated version obtained from: https://www.euda.europa.eu/drugs-library/drug-use-disorders-identification-test-dudit_en

4.6.3.3 GAD-7

Full name: Generalized Anxiety Disorder-7
Disorder area: Anxiety disorders
Description: Screening test for assessing anxiety symptoms
License: Freely usable according to the copyright holder's terms
For further information: Contact the original authors and/or refer to the pubilcations below
Note: No content-related or technical support provided by SCHUHFRIED
Reference list:

Original literature:
Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092
Scoring:
Spitzer, R. L., Jr., Kroenke, K., Williams, J. B. W., & PRIME-MD. (2006). PHQ and GAD-7 Instructions. In Instructions for Patient Health Questionnaire (PHQ) and GAD-7 Measures (pp. 1–9). https://www.phqscreeners.com/images/sites/g/files/g10016261/f/201412/instructions.pdf. (retrieved on 16.01.2026)
Integrated version obtained from: https://www.phqscreeners.com/select-screener

4.6.3.4 PHQ-9

Full name: Patient Health Questionnaire–9
Disorder area: Depressive disorders
Description: Screening test for assessing depressive symptoms
License: Freely usable according to the copyright holder's terms
For further information: Contact the original authors and/or refer to the pubilcations below
Note: No content-related or technical support provided by SCHUHFRIED
Reference list:

Original literature:
Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606–613.
Scoring:
Spitzer, R. L., Jr., Kroenke, K., Williams, J. B. W., & PRIME-MD. (2006). PHQ and GAD-7 Instructions. In Instructions for Patient Health Questionnaire (PHQ) and GAD-7 Measures (pp. 1–9). https://www.phqscreeners.com/images/sites/g/files/g10016261/f/201412/instructions.pdf. (retrieved on 16.01.2026)
Integrated version obtained from: https://www.phqscreeners.com/select-screener

4.6.3.5 PID5BF+ M

Full name: Personality Inventory for DSM-5 and ICD-11 – Modified Brief Form
Disorder area: Personality disorders
Description: Questionnaire for the dimensional assessment of maladaptive personality traits
License: CC-BY-SA
For further information: Contact the original authors and/or refer to the pubilcations below
Note: No content-related or technical support provided by SCHUHFRIED
Reference list:

Original literature:
1. Kerber, A., Schultze, M., Müller, S., Rühling, R. M., Wright, A. G. C., Spitzer, C., Krueger, R. F., Knaevelsrud, C., & Zimmermann, J. (2022). Development of a Short and ICD-11 Compatible Measure for *DSM-5* Maladaptive Personality Traits Using Ant Colony Optimization Algorithms. *Assessment*, *29*(3), 467–487. https://doi.org/10.1177/1073191120971848
2. Bach, B., Kerber, A., Aluja, A., Bastiaens, T., Keeley, J. W., Claes, L., Fossati, A., Gutierrez, F., Oliveira, S. E. S., Pires, R., Riegel, K. D., Rolland, J. P., Roskam, I., Sellbom, M., Somma, A., Spanemberg, L., Strus, W., Thimm, J. C.,

Wright, A. G. C., & Zimmermann, J. (2020). International Assessment of DSM-5 and ICD-11 Personality Disorder Traits: Toward a Common Nosology in DSM-5.1. *Psychopathology*, *53*(3-4), 179–188. https://doi.org/10.1159/000507589

Scoring:

Rek, K., Kerber, A., Kemper, C.J., & Zimmermann, J. (2021). Getting the Personality Inventory for DSM-5 ready for clinical practice: Norm values and correlates in a representative sample from the German population. PsyArXiv. https://doi.org/10.31234/osf.io/5hm43

Integrated version obtained from: https://www.ewi-psy.fu-berlin.de/psychologie/arbeitsbereiche/klinische_psychotherapie/Frageboegen/Persoenlichkeitsinventar-fuer-DSM-5-und-ICD-11_PID5BF__PID5BF_MDE/index.html

5 SUPPORT

Please note that the functionality of VTS is only guaranteed if your system is kept up to date. Please refer to the information in the section update and support policy for more details. If you have VTS version 8.27 or higher, you can obtain a free update to the latest VTS version from the Marketplace. How to perform an update yourself is described on the page: Updating a single workstation installation

5.1 Contact us

For frequently occurring problems, you will find possible solutions on the Troubleshooting page. Please try to find a solution to your problem there before contacting our technical support.

Technical support

Our support team is available to answer technical questions or help with difficulties you may encounter. Technical support from SCHUHFRIED is free of charge provided that the problem was caused by SCHUHFRIED and your VTS version is not older than 36 months (see: Product description).

You can reach our support team:

By using our contact form

By phone: +43 2236 42315-360

Mon-Thu: 8:00 a.m. - 4:00 p.m. (CET)

Fri: 8:00 a.m. - 1:30 p.m. (CET)

To enable our support team to assist you quickly and easily:

- Please have the **serial number of the system** or your **customer number** ready.
- Please download the **TeamViewer** linked here if requested to do so by our support team.

Error Download TeamViewer

Product information & psychological consulting

A team of experienced psychologists is available to answer any questions you may have about our products:

Austria: +43 2236 42315-0

info@schuhfried.com

http://www.schuhfried.com

5.2 Troubleshooting

If you are experiencing problems with peripheral devices (our external hardware, such as the panel), you can also use the VTS Hardware Tests to narrow down possible problems.

If the problems cannot be solved using the solutions listed here, our support team is available to assist you.

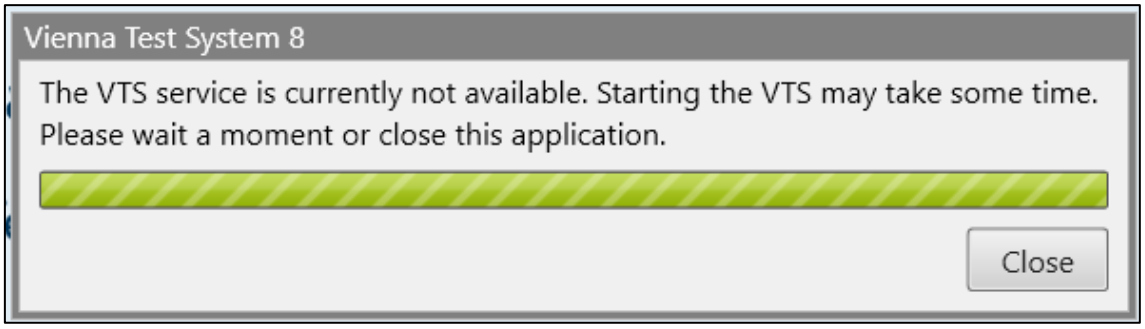
5.2.1 The VTS does not start

5.2.1.1 Description

After attempting to start the VTS administration software, the VTS does not open. This can happen if:

- the **WTS Service** has not been started
- the **Sentinel LDK License Manager** service has not been started
- the **SQL Server (WTSNXEXPRESS)** service has not been started
- the **VTS dongle** has not been recognized, if you are using it for licensing the VTS
- the **system capacities** are too small

The following message may be displayed: *The VTS Service is currently not available. Starting the VTS may take some time. Please wait a moment or close this application.*



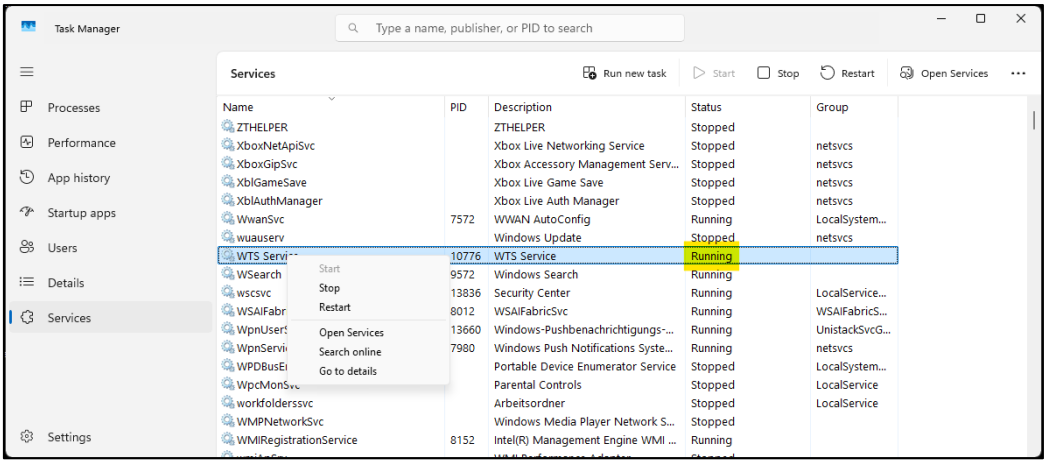
5.2.1.2 Troubleshooting

1 - The services required for the VTS have not been started

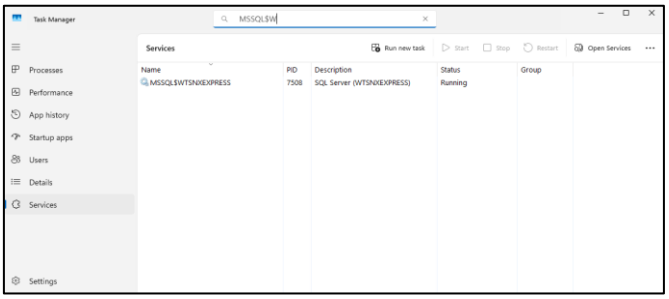
Restart the services and try again.

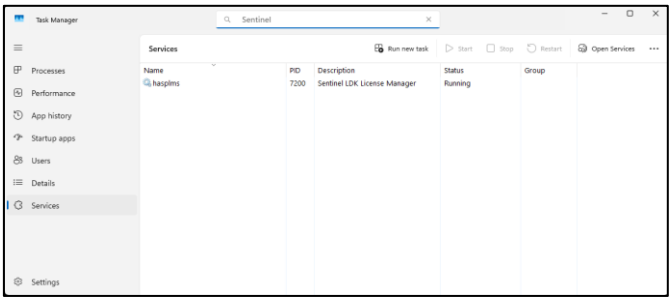
> Administrator rights are required to restart the services. If you do not have these rights, restart your PC.

1. To restart the *WTS Service*, start the Task Manager (press CTRL+SHIFT+ESC) and select *Services*.
2. Then search for W*TS Service* and check whether the status is *Running* (marked yellow in the screenshot).



3. If this is not the case, right-click on *WTS Service* and press *Start* or *Restart*.
4. Check in the same way whether the *SQL Server (WTSNXEXPRESS)* service and the *Sentinel LDK License Manager (hasplms)* service are running and start them if necessary.





2 - The VTS dongle was not recognized

1. Make sure that the correct VTS dongle (with the serial number that matches the installation) is plugged into the PC.
2. If necessary, disconnect the VTS dongle and reconnect it, then restart the PC.
3. Start the VTS administration software.

3 - System capacities are too small

1. Make sure that your PC meets the system requirements.

5.2.2 Degraded Performance

5.2.2.1 Description

The VTS is slow during test execution or administration. There are long loading times at the start of the test, during test execution, or even interruptions during testing.

5.2.2.2 Troubleshooting

1 - Check system requirements and resources

Check that the hardware used meets the minimum requirements according to the VTS system requirements. Also ensure that sufficient hard disk space is available and that your systems are operating well under normal conditions. You can check this using the Windows Task Manager or the *Device Performance and Health* section in the Windows security app.

2 - Antivirus software

Various antivirus or security programs can interfere with or impair the execution of the Vienna Test System. In such cases, we recommend defining exception rules in the respective tool. The following directories contain system components and files relevant to the VTS and should be excluded:

Index	Example path
%ProgramData%\Schuhfried	C:\ProgramData\Schuhfried
%LOCALAPPDATA%\Schuhfried	C:\Benutzer\Benutzer\AppData\Local\Schuhfried
%ProgramFiles%\SCHUHFRIED GmbH	C:\Programme\SCHUHFRIED GmbH
%ProgramFiles(x86)%\SCHUHFRIED GmbH	C:\Program Files (x86)\SCHUHFRIED GmbH

In addition, some of these programs also feature active process monitoring, usually referred to as *real-time protection*, *behavior monitoring*, *process monitoring*, or similar. Such process monitoring can have a negativ impact on the performance of the VTS. We also recommend excluding the following VTS processes from monitoring using rules in the respective tool:

- VTS.IdentityServer.Web
- VTS.Integration.Service
- VTS.Portal.Api
- VTS.Portal.Web
- VTS.Service.Wcf
- VTS.TestPlayer.Web

3 - Delayed certification revocation checks

In environments with restricted internet access, it can happen that the start of VTS Testplayer Client is significantly slowed down due to unsuccessful certificate checks performed by the Windows operating system. Please refer to Long loading times when starting the VTS Testplayer Client.

4 - Drivers and Windows updates

Check that your system has the latest drivers for all system components and that all available Windows updates have been installed. Some PC manufacturers (e.g., Dell, HP, IBM, Lenovo, etc.) provide their own drivers for graphics cards. Please ensure that the latest drivers for your graphics card are installed on your PC.

5 - Other programs

Please ensure that no programs are installed on the computer that could interfere with testing (e.g., by heavily loading the CPU, consuming excessive memory, or displaying output on the screen).

6 - Network connection

When using VTS online or a server/client installation, please ensure that you have a sufficiently fast connection to the internet or to your VTS server.

7 - VTS update

We recommend always using the latest VTS version in order to benefit from performance improvements as soon as they become available.

5.2.3 Panel is not recognized

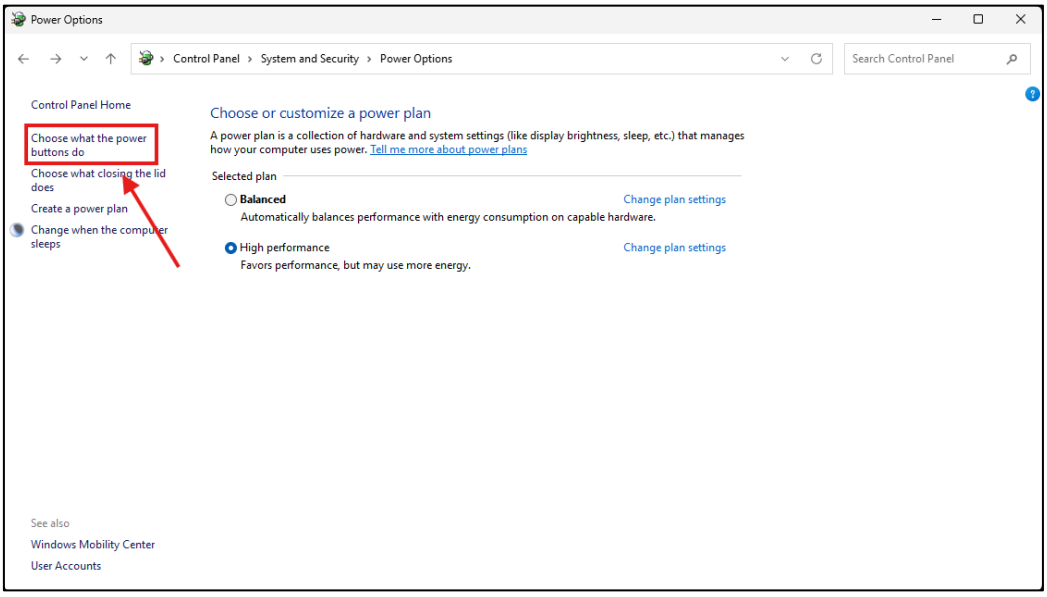
5.2.3.1 Description

The panel (USB panel) is not recognized by the PC. This issue may be caused by the Quick Start feature being enabled in the Windows power settings. When the system wakes up, some drivers may not load correctly.

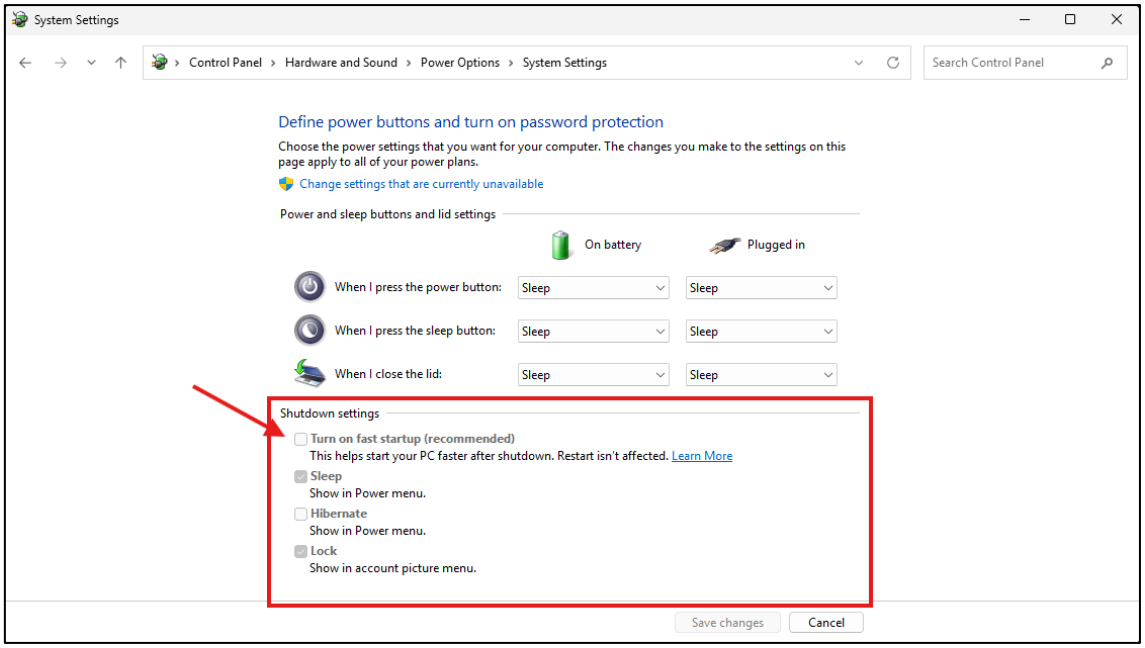
5.2.3.2 Troubleshooting

Unplug the USB panel, wait 30 seconds, and then plug the panel back in. To prevent this problem in the future, **disable Windows Fast Startup**:

1. Open the power options via *Control Panel --> All Control Panel Items --> Power Options*:



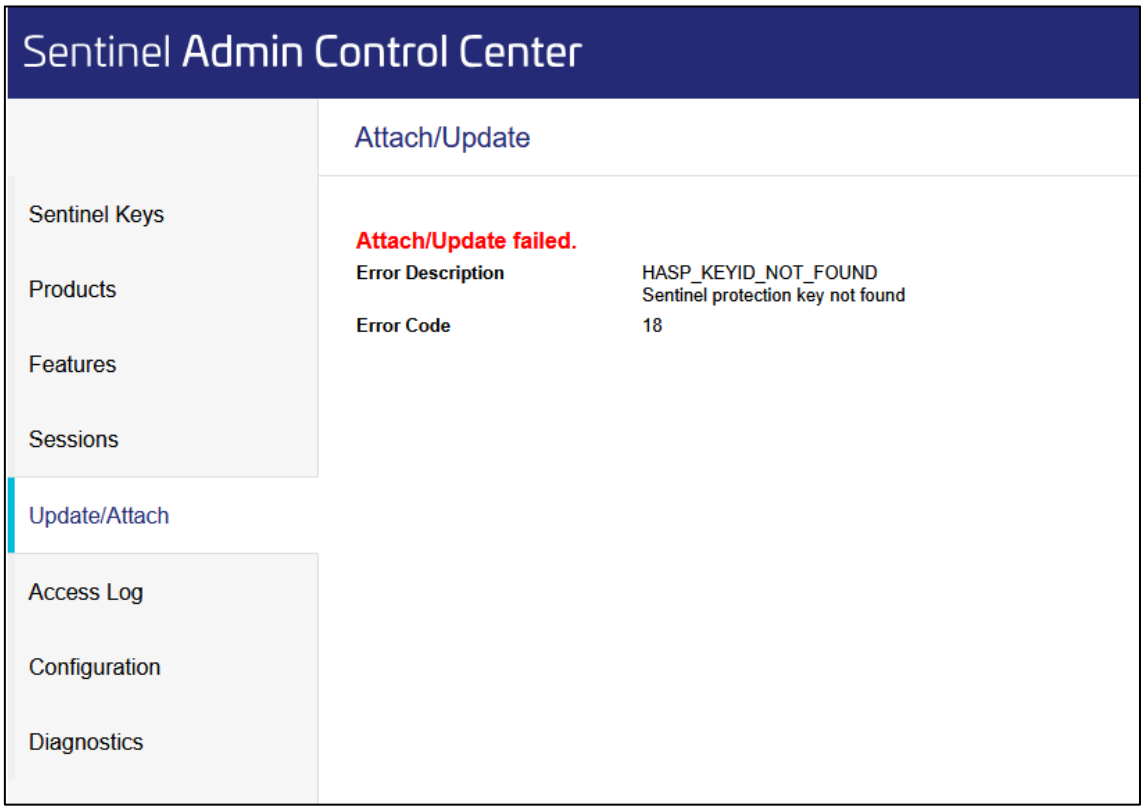
2. On the left side, select *Choose what the power buttons do* and make sure that *Turn on fast startup (recommended)* is NOT enabled.



5.2.4 Licenses cannot be installed

5.2.4.1 Description

When trying to import a license file into the *Sentinel Admin Control Center* (see: Install licenses), the error message **HASP_KEYID_NOT_FOUND** with error code 18 appears.



This error message indicates that you are trying to install a license file with an incorrect Hasp ID. This can have the following causes:

- You are trying to install a license file, e.g. for the serial number (multi-client) W03812_002, on the PC with the serial number (multi-client) W03812_001.

Please check whether the name of the serial number matches the serial number of the installed VTS on the PC.

- You can find the multi-client name (serial number) of your installed VTS as shown in the following screenshots:

Figure 51 On the Environment details page (new VTS user interface)

Figure 52 Under Settings → General settings → Info (in the old VTS user interface)

- You have received a new hardware dongle or software dongle from SCHUHFRIED, but the license file was created for the old serial number. In this case, please contact our support team.

5.2.4.2 Troubleshooting

5.2.4.2.1 Try again on the correct PC

1. Once you've verified that the license file matches the serial number of the installed VTS, open your browser and go to: http://localhost:1947.
2. Select *Update/Mount* and go to *Select File*. Please select the V2C license file and confirm.
    a. For more details, see: Install licenses.

5.2.5 Problems printing test results

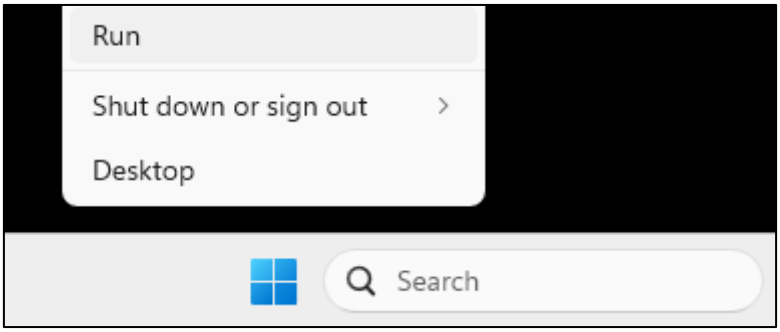
5.2.5.1 Description

Test results cannot be printed. This may be due to the Windows feature *Microsoft XPS Document Writer* not being enabled.

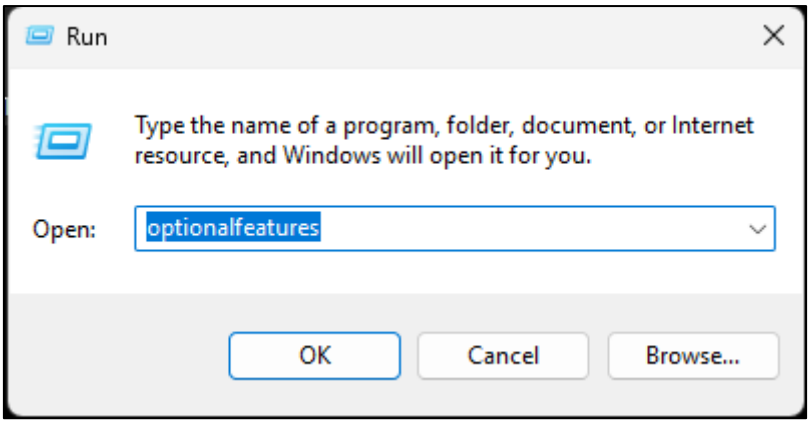
5.2.5.2 Troubleshooting

Enable *Microsoft XPS Document Writer:*

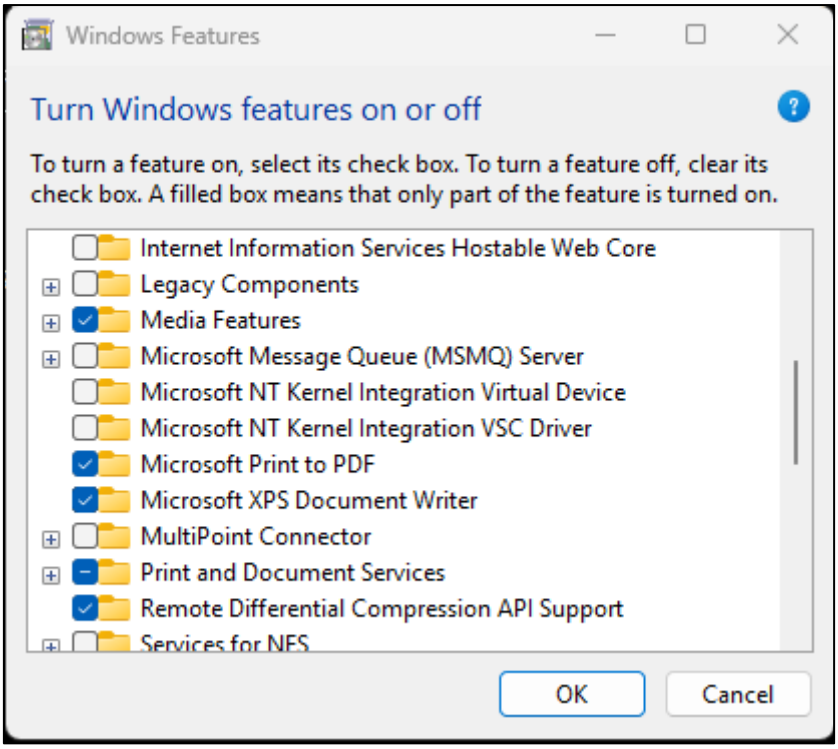
1. Right-click on the Windows icon in the taskbar and select *Run.*



2. Enter `optionalfeatures` and confirm by clicking *OK*.



3. In the window that opens, enable the option *Microsoft XPS Document Writer* and confirm by clicking *OK*.

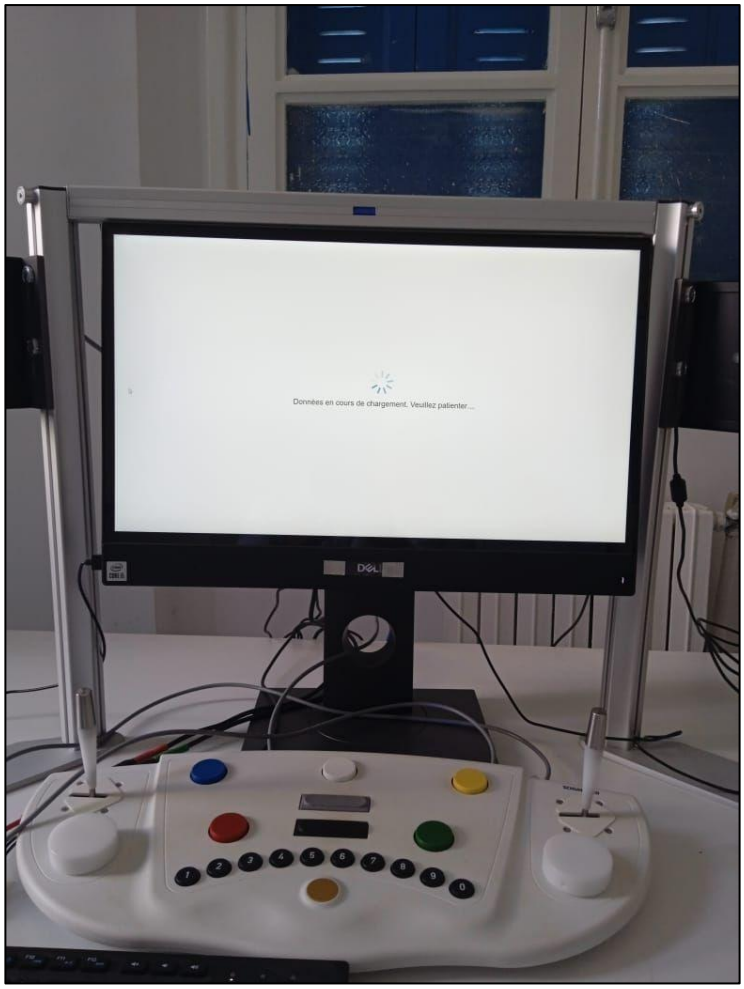


4. Restart the PC.

5.2.6 The Testplayer Client fails to load

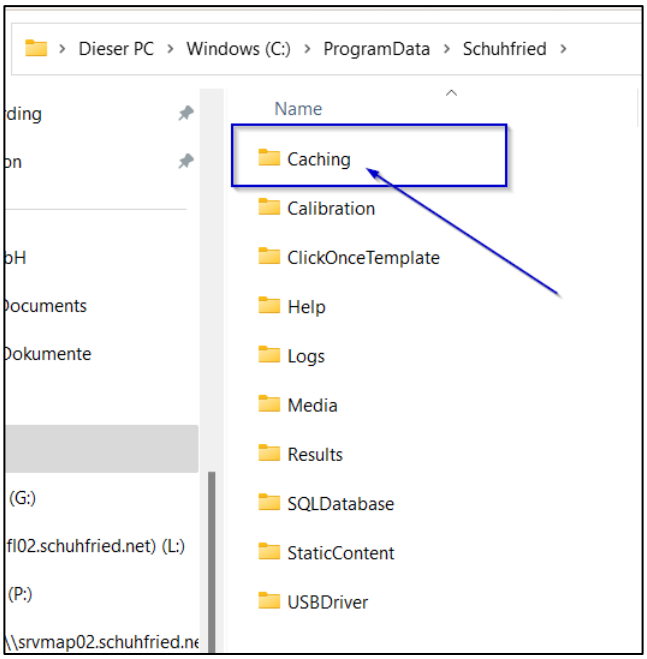
5.2.6.1 Description

After attempting to start a test, the Testplayer Client fails to finish loading and remains stuck on the loading screen:



5.2.6.2 Troubleshooting

1. Please delete the caching folder in %programdata%\schuhfried and restart the test.



5.2.7 Long loading times when starting the VTS Testplayer Client

5.2.7.1 Description

In environments with limited or no internet access, Windows certificate checks may cause long loading times when starting the VTS Testplayer Client.

Normally, VTS offline works without restrictions even when there is no internet connection. However, Windows is typically configured to verify the digital signatures of executable files. As part of this process, it tries to download certificate revocation lists (CRLs) from public URLs provided by the issuing certification authority.

If access to these URLs is unavailable, but not explicitly blocked, the system may wait several seconds for each failed download attempt before timing out.

SCHUHFRIED follows best practices and digitally signs all executables with a strong Extended Validation (EV) code signing certificate issued by *GlobalSign*. While this improves security, security checks can also cause noticeable delays in restricted network environments. Loading multiple signed files may cause a cumulative delay of several minutes at the start of a test.

It is important to note that these checks are performed by the Windows operating system, not by VTS.

5.2.7.2 Troubleshooting

To verify if a system is affected, the following command can be run in a PowerShell instance:

```
PS> Invoke-WebRequest crl.globalsign.com -TimeoutSec 20
```

If the command hangs and times out after 20 seconds, the system is affected. If it completes immediately, it is likely not affected.

The following measures can help reduce delays:

1 - Allow access to *.globalsign.com (recommended)

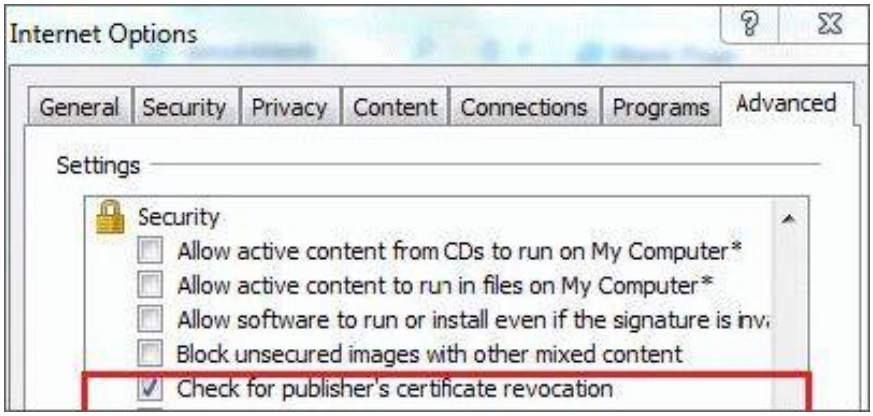
Checking certificate revocation lists is an important security measure and should ideally stay enabled. In the case of VTS, since we use a GlobalSign certificate, this requires access to crl.globalsign.com and ocsp.globalsign.com. However, it is generally recommended to allow CRL checks for all installed root certificates. Refer to your computers certificate store.

2 - Block access to *.globalsign.com

The delay occurs because download attempts time out. If requests to *.globalsign.com are actively blocked, the delays do not happen.

3 - Disable certificate revocation checks

On the affected machine, open *Internet Options* and disable *Check for publisher's certificate revocation*:



5.2.8 Umlauts are not imported correctly

5.2.8.1 Description

When importing persons into VTS, special characters, such as umlauts, are not imported correctly into VTS. The import is done via a .csv file containing the required personal data. This problems may occur if the .csv file is not formatted correctly.

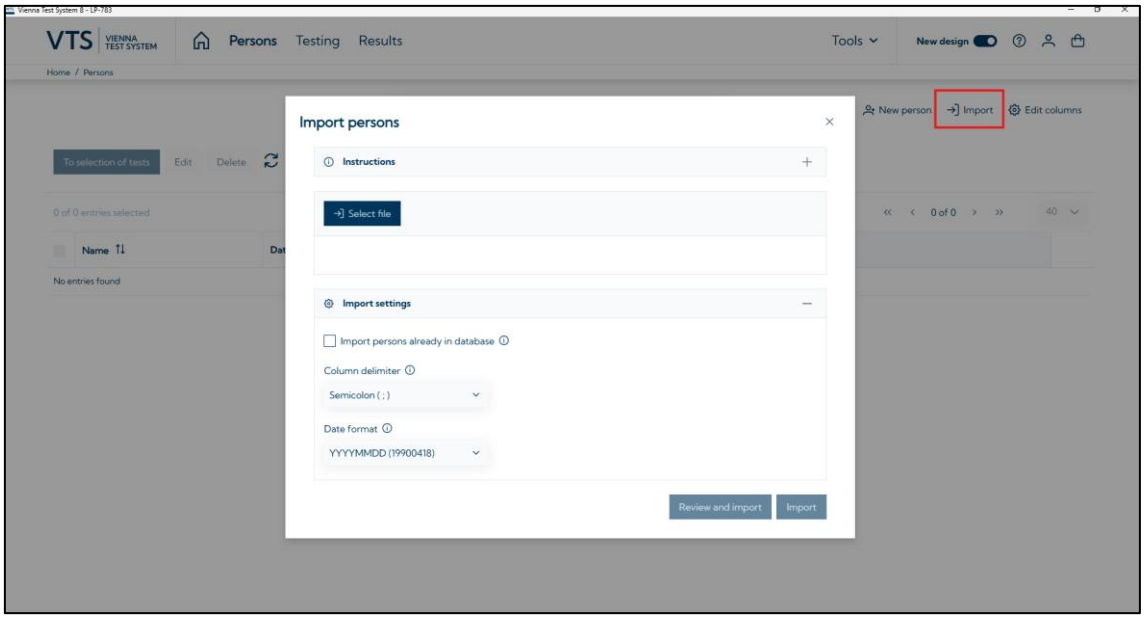


Figure 53 Importing persons into VTS

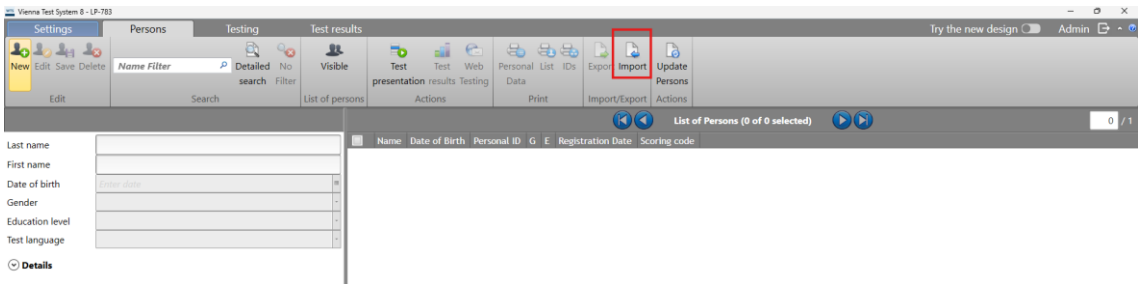


Figure 54 Importing persons into VTS (old VTS user interface)

5.2.8.2 Solution

1. Make sure the correct file format option is selected when saving.
    a. When using Microsoft Excel: Use the *Save As* option and select *CSV UTF-8 (delimited) (*.csv)*.

5.2.9 Test results are not merged into a single test result

5.2.9.1 Description

Two test results for the same test taker are not merged into a single test result, even though this should be supported. The VTS offers the option of merging test results for the same test taker from the same test in order to obtain a single test result. This can be useful if, for example, different subtests of the same test are taken at two different times. However, this only works if the test times of the results you want to merge are not too far apart.

The limits are:

- When merging **individual test results and test set results**, there is a limit of **3 months** (exactly 3 * 30 days = 90 days).
- For the **CFD** test set, the limit is **10 days.**

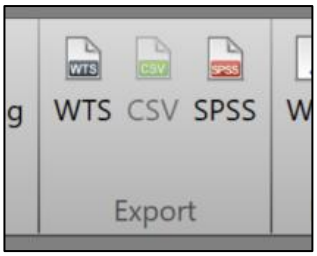
5.2.9.2 Troubleshooting

Please ensure that the test times of your test results do not exceed the limits mentioned above.

5.2.10 CSV export is grayed out

5.2.10.1 Description

The export of test results in .csv format is grayed out. This affects older VTS versions prior to 8.29 (if the old VTS user interface is used).



5.2.10.2 Troubleshooting

- You must first create an export definition in the VTS under *Settings → Data export/import → Manage export settings*.
- For more information, please use the VTS help function in the upper right corner (blue and white question mark icon) and search for *Export Definition*.
- No additional license is required to use CSV export.

5.3 Update & Support policy

The VTS is continuously being developed and improved. A new VTS version is generally released twice a year, in March and September. This includes new functions and improvements to the tests and the administration software. In addition, the norms of the tests and the available languages are continuously updated (if the test is part of our actively maintained portfolio[1]).

SCHUHFRIED guarantees the functionality of the Vienna Test System only if the Vienna Test System is kept up to date, if your VTS version was released more than 36 months ago, the functionality of the system is no longer guaranteed and any technical support is subject to a fee. For details see our terms and conditions. We therefore strongly recommend that the software be updated continuously.

To keep your system up to date, SCHUHFRIED offers **free updates**[2] for VTS. To receive these updates, **you must have VTS version 8.27 or higher**. If this is the case, you will receive the installation package for the update free of charge in our marketplace and can update your VTS installation to the latest version yourself (see: Updating a single workstation installation).

If technical problems arise during an update, SCHUHFRIED will assist you in troubleshooting, provided that the problems were caused by SCHUHFRIED (e.g., by an error in the software) and your VTS version is not older than 36 months. If your VTS version is older than 36 months, technical support from SCHUHFRIED for an update is subject to a fee.

> Which VTS versions are currently supported can be found on the page: Supported VTS versions.

If technical problems occur during operation, technical support from SCHUHFRIED is free of charge if the problems were caused by SCHUHFRIED and your VTS is not older than 36 months (see above). Therefore, please keep your VTS up to date. If you use VTS online, you will always have the latest version without any additional update or effort.

[1] Currently, these are the tests: 2HAND, ATAVT, ATAVT-2, BMT, COG, DT, FCB5, INT, IVPE-R, LAT, MECH, MOUSE, PRIO, RT, SIGNAL, SPAN, STROOP, TACO, TMT-S, VIGIL, AVEM, GET, INSBAT 2, LVT, MLS, PP-R, SIMKAP, SMK, TOL-F, WAF, ZBA

[2] This does not apply to server/client installations where the update requires support from SCHUHFRIED's technical support team.

5.3.1 Supported VTS versions

The list on this page provides an overview of the recent VTS versions, their release date and when support for the version ends. For VTS versions that are no longer supported, the functionality is no longer guaranteed and technical assistance from SCHUHFRIED is subject to a fee.

VTS version	Release date	Supported until
8.30	March 2026	March 2029
8.29	September 2025	September 2028
8.28	March 2025	March 2028
8.27	August 2024	August 2027
8.26	December 2023	December 2026
8.25	August 2023	August 2026
8.24	April 2023	April 2026

6 PERIPHERAL DEVICES

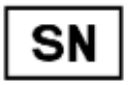
6.1 Operating instructions, safety and maintenance

Here you will find information on operating and maintaining the peripheral devices.

6.1.1 Warnings

This symbol means:
Caution, the hardware manual must be read before operation.

Symbol for the manufacturing date. The year in which the device was produced is shown next to the symbol.



Symbol for the manufacturing date. The year in which the device was produced is shown next to the symbol.

The product must be disposed of with certain waste material collection points or recycling centers or via the manufacturer.

Symbol for the manufacturer. The manufacturer is provided next to this symbol.

Symbol for a device of protection class 2 according to IEC 60417-4172

Symbol for the designation of the device. The designation stands next to the symbol.

This symbol specifies the permissible temperature range.

This symbol specifies the permissible humidity for the storage.

This symbol specifies the permissible atmospheric pressure for the storage.

6.1.2 Maintenance of the devices

All VTS devices are maintenance-free. However, it is recommended to check their proper functioning using the Vienna Test System hardware test every six months.

Maintenance, repairs, and modifications must be carried out in accordance with currently effective legal regulations (e. g. Electrical Engineering Act).

Alterations and repairs carried out by unauthorized individuals or companies invalidate the manufacturer's warranty and product liability.

The devices must always be switched off before cleaning. Use only disinfectants, or mild detergents, to clean the equipment with a soft cleaning cloth. Avoid applying cleaning or disinfecting agents directly to the unit and its parts to prevent liquid from penetrating the enclosure.

Surface disinfectants are generally suitable for cleaning or disinfecting the devices. If the devices are used in healthcare facilities, only disinfectants approved for medical devices in accordance with the Medical Devices Act and Directive 93/42/EEC should be used. Permitted are alcohol-based (ethanol) or active oxygen-based liquids that do not contain solvents and are non-abrasive. (e.g. Schülke mikrozid AF liquid or ANTISEPTICA Descogen Liquid r.f.u.).

Wait a few minutes after cleaning the devices before using them again. This allows any remaining cleaning or disinfectant residues to evaporate.

The product life provided by the manufacturer is 10 years from the date of manufacture. This date can be found on the nameplate.

6.1.2.1 Packaging and transport

The packaging is reusable and should be kept for possible transport. We recommend the same conditions for transport as for storage. The foam contained in the packaging is made of pure PE and is CFC-free.

6.1.3 Safety

Although the devices are not classified as medical devices, they have been developed in accordance with the requirements of the ÖVE standard EN 60601. They only comply with these regulations when connected to a computer system that also complies with these regulations.

Route the connecting cables in a way that prevents the devices from being accidentally pulled or knocked over. The cables should be kept out of the test taker's reach, while ensuring there is enough length for each person to place the devices in a comfortable and accessible position.

When using headphones, ensure that the volume is not set to maximum before the test taker puts them on to prevent potential hearing damage.

Do not use any peripheral device if any parts are damaged or broken. The USB peripheral devices of the VTS must not be used in damp environments or in areas with a risk of explosion.

6.1.3.1 EMC notes

If the input and output devices of the Vienna Test System are used in a clinical environment, special precautions regarding EMC must be taken. Even in the non-medical environment, special care must be taken with regard to EMC. To ensure safe operation, the use of portable and mobile HF communication systems is prohibited, because they could interfere with the functioning of the system.

6.1.3.2 ESD notes

All input devices incorporate all precautions against electrostatic discharge necessary to prevent damage to components. The excess energy is discharged to earth by means of protective diodes. If the input device crashes, the points in the chapter Hardware Test for MLS and PP-R must be carried out. If the device failed during a test, the test must be repeated. ESD discharges can be caused by friction between rubber soles and plastic or carpeted floors. Particular caution is required when touching electrically conductive elements.

The chapter *Guidelines and manufacturer's declaration for EMC-compliant installation in healthcare facilities* discusses EMC-compliant repair and the applicable guidelines in more detail.

6.1.4 Exclusion of liability

The manufacturer or supplier can only be held responsible for matters affecting safety or performance of the device if

- assembly, upgrades, re-setting, alterations or repairs are carried out by persons authorized by him and
- the electrical installation at the place of use conforms to IEC or ÖVE EN 7 regulations and
- the devices are used in accordance with the instructions, and are not used at the same time as USB peripheral devices of other manufacturers.

6.1.5 Guidelines and manufacturer's declaration for EMC-compliant installation in healthcare facilities

Table 1: Electromagnetic emissions

The panel is intended for operation in the environment specified below. The customer or user of the panel should ensure that it is operated in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidelines
RF emissions CISPR 11	Group 1	The Panel Ag/Ug uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The PANEL Ag/Ug is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage changes and flicker IEC 61000-3-3	Not applicable	

Table 2: Electromagnetic immunity

The panel is intended for operation in the electromagnetic environment specified below. The customer or user of the panel should ensure that it is used in such an environment.

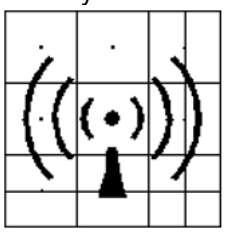
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guideline
Electrostatic discharge (ESD) according to IEC 61000-4-2	± 6 kV contact discharge ± 8 kV air discharge	± 6 kV contact discharge ± 8 kV air discharge	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	Not applicable	The quality of the supply voltage should correspond to that of a typical business or hospital environment.
Surge voltages according to IEC 61000-4-5	± 1 kV differential mode voltage ± 2 kV common mode voltage	Not applicable	The quality of the supply voltage should correspond to that of a typical business or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	< 5 % U_T (> 95 % dip in U_T) for ½ cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles < 5 % U_T (> 95 % dip in U_T) for 5 s	Not applicable	The quality of the supply voltage should be equivalent to that of a typical business or hospital environment. If the user of the Panel Ag/Ug requires continued operation even in the event of power supply interruptions, it is recommended that the Panel Ag/Ug be powered from an uninterruptible power supply or a battery.
Magnetic field at supply frequency (50 Hz/60 Hz) according to IEC 61000-4-8	3 A/m	3 A/m	Magnetic fields at mains frequency should be typical of those found in commercial and hospital environments.

Note: U_T is the mains AC voltage before the test levels are applied.

Table 3: Electromagnetic immunity

The panel is intended for operation in the electromagnetic environment specified below. The customer or user of the panel should ensure that it is used in such an environment.

Immunity tests	IEC 60601 test level	Compliance level	Electromagnetic environment - guidelines
			Portable and mobile radio equipment shall be used at a distance from the Ag/Ug panel, including the cables, not less than the recommended safety distance calculated according to the equation appropriate for the transmission frequency. **Recommended safety distance:**

Immunity tests	IEC 60601 test level	Compliance level	Electromagnetic environment - guidelines
Conducted RF disturbances according to IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz	3 → *V*1 in V	$d = \left(\frac{3,5}{V1}\right) * \sqrt{P}$
Radiated RF disturbances according to IEC 61000-4-3	3 V/m 80 MHz to 2,5 GHz	3 → *E*1 in V/m	$d = \left(\frac{3,5}{E1}\right) * \sqrt{P}$ Figure 55 for 80 MHz to 800 MHz
			$d = \left(\frac{7}{E1}\right) * \sqrt{P}$ Figure 56 for 800 MHz to 2,5 GHz
			where P is the maximum rated power of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended safety distance in meters (m). The field strength of stationary radio transmitters should be less than the compliance level at all frequencies according to an on-site investigation[a,b]. Interference may occur in the vicinity of devices bearing the following symbol: 

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: These guidelines may not be applicable in all cases. The propagation of electromagnetic fields is influenced by absorption and reflection from buildings, objects, and people.

[a] The field strength of stationary transmitters, such as base stations for mobile telephones and mobile land radio services, amateur stations, AM and FM radio and television transmitters, cannot be accurately predicted in theory. In order to determine the electromagnetic environment resulting from stationary RF transmitters, an investigation of the location is recommended. If the determined field strength at the location of the Panel Ag/Ug exceeds the above-mentioned compliance level, the Panel Ag/Ug must be observed with regard to its normal operation at each location of use. If unusual performance characteristics are observed, it may be necessary to take additional measures, such as changing the orientation or location of the Panel Ag/Ug.

[b] Over the frequency range from 150 kHz to 80 MHz, the field strength should be less than [V1] V/m.

Table 4: Recommended safety distances

Recommended separation distances between portable and mobile RF telecommunications equipment and the panel.

The Panel Ag/Ug is intended for operation in an electromagnetic environment in which RF disturbance levels are controlled. The user of the Ag/Ug panel can help to avoid electromagnetic interference by maintaining the minimum distance between portable and mobile RF telecommunications equipment (transmitters) and the Ag/Ug panel, depending on the output power of the telecommunications equipment, as specified below.

The protective distance depends on the transmission frequency in m

Nominal power of the transmitter W	150 kHz to 80 MHz $d = \left(\frac{3,5}{V1}\right) * \sqrt{P}$	80 MHz to 800 MHz $d = \left(\frac{3,5}{E1}\right) * \sqrt{P}$	800 MHz to 2,5 GHz $d = \left(\frac{7}{E1}\right) * \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.69	3.69	7.38
100	11.67	11.67	23.33

For transmitters whose maximum rated power is not specified in the above table, the separation can be determined using the equation corresponding to the relevant column, where P is the maximum rated power of the transmitter in watts (W) as specified by the transmitter manufacturer.

Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: These guidelines may not be applicable in all cases. The propagation of electromagnetic fields is affected by absorption and reflection from buildings, objects, and people.

6.2 Hardware Tests

On this page you will find information on how to check that your peripheral hardware devices are functioning correctly for the Vienna Test System.

6.2.1 VTS Hardware Test

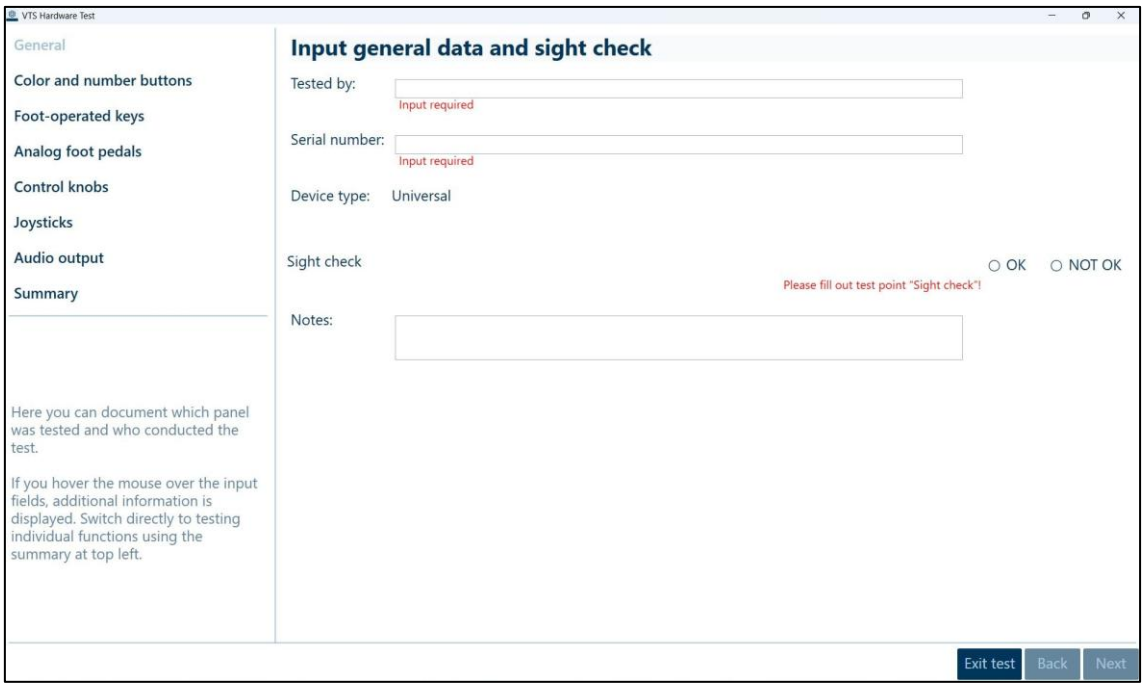
To check that the panel and associated peripheral devices, such as foot operated keys or foot pedals, are functioning correctly, the Vienna Test System includes a test program called the *VTS Hardware Test*.

6.2.1.1 VTS Hardwaretest

You can find the *VTS Hardware Test* in the menu under *Applications*. To start the *VTS Hardware Test*, click on the *Apply* button there. Please ensure that the panel is connected to the computer **before** clicking on *Apply*.

On the left side of the screen, you will see a menu at the top with various test items (e.g., General, Color and Number Keys, Sound Output, etc.). The test item you are currently working on is highlighted in light blue. You can jump directly to the individual items at any time by clicking on them or perform the entire *VTS Hardware Test*.

In the lower section on the left-hand side, you will see the instruction texts that guide you through the test steps. Please follow the respective instructions.



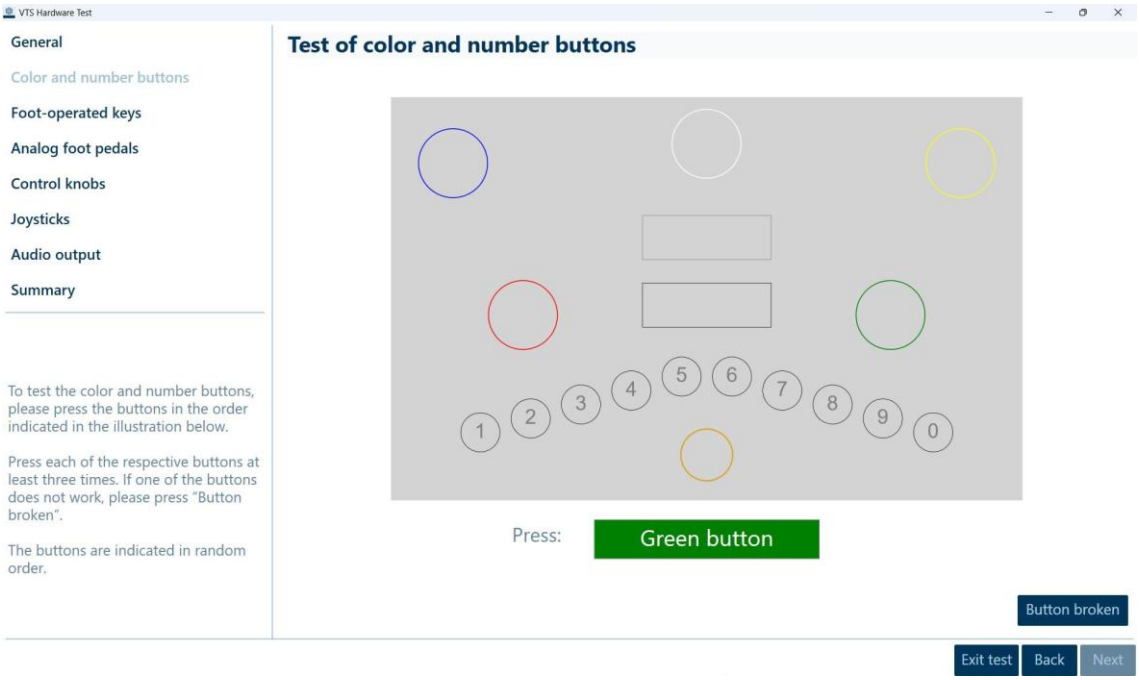
6.2.1.1.1 General

On the first page, you will be asked to document some general information about the test. Please indicate who is performing the test and the serial number of your panel. The visual inspection section is intended to confirm that there are no obvious defects or damage to the panel (e.g., missing buttons, heavy soiling, etc.). Finally, there is also a text field where you can document any abnormalities.

Once you have completed all the points, click *Next* to proceed to the next page.

6.2.1.1.2 Color and number buttons

On the Color and Number Button Test page, you can check all color and number buttons as well as the golden area on the panel for functionality. Once you have completed the test, you can proceed to the next test point by clicking *Next.*



6.2.1.1.3 Foot operated keys and analog foot pedals

On these pages, you can test the proper functioning of the foot operated keys (required for tests DT and PP-R) and analog foot pedals (required for test SMK). If you do not have foot operated keys or analog foot pedals available, you can skip the respective test by selecting the *Not available* checkbox and proceed to the next test item.

6.2.1.1.4 Control knobs and joysticks

A Universal Panel (UH) is required for testing control knobs and joysticks. If your panel does not have any rotary controls and/or joysticks, you can skip these tests by selecting *Not available* and proceed to the next item.

6.2.1.1.5 Audio output

Depending on your panel generation, the audio output can be tested either directly via the panel itself or via a connected USB audio output device.

6.2.1.1.6 Summary

This page summarizes the results of the *VTS Hardware Test*. For each test point, it indicates whether the test was performed (completely) and whether it was successful. In addition, this page allows you to save or print a results report as a PDF file.

The results of the *VTS Hardware Test* are not saved. Once you finish the test, the data collected up to that point will be deleted.

6.2.1.1.7 Troubleshooting

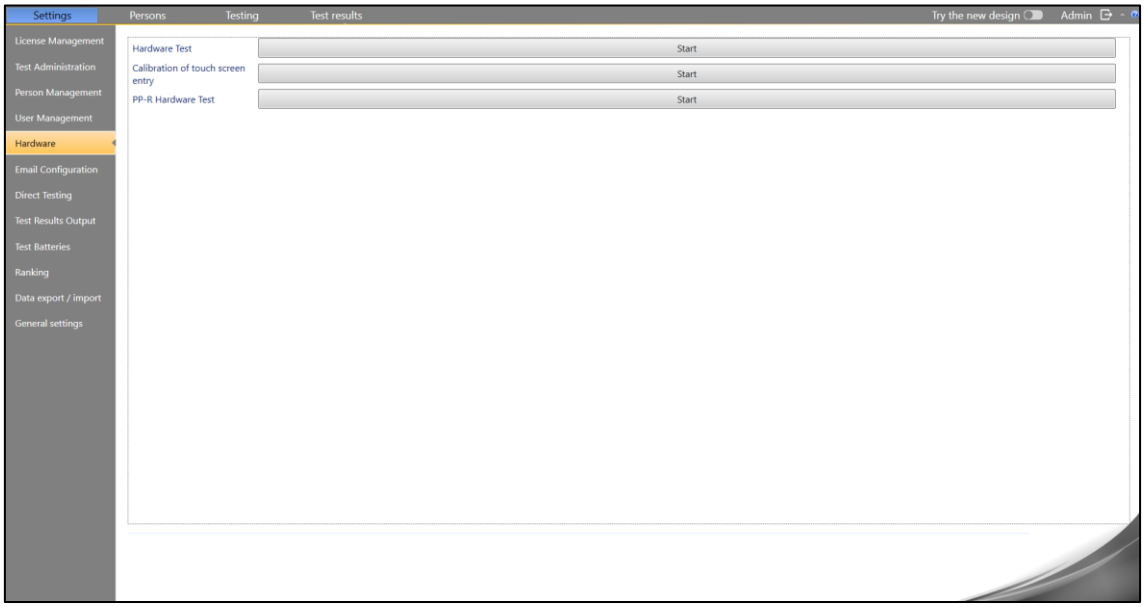
If a peripheral device isn't functioning properly, try the following steps to locate and resolve the problem:

- Disconnect the device and reconnect it
- Restart Windows
- Connect the device to a different USB port (the device driver may need to be reinstalled)
- Disconnect other USB devices

- Connect the device directly to the computer without a USB hub

6.2.2 Hardware Test for MLS and PP-R

In the VTS AdminClient you ca start the hardware tests for special input devices under *Settings → Hardware*:



- To check one of the following devices, click the *Start* button next to *Hardware Test*:
  - MLS work panel
  - Flicker tube
  - Peripheral Perception (PP-HW – with serial interface and solid aluminum base plate)
- To check the **Peripheral Perception PP-HW2** (USB interface), select *Start* next to *PP-R Hardware Test*.

6.2.2.1 Hardware Test

Use the hardware test to check the functional suitability of the peripheral devices of the Vienna Test System after completing the installation.

At the beginning, a window will appear showing which devices are connected. Please verify that “Yes” appears for all your devices. After clicking *OK*, the hardware test will start with the first device entered.

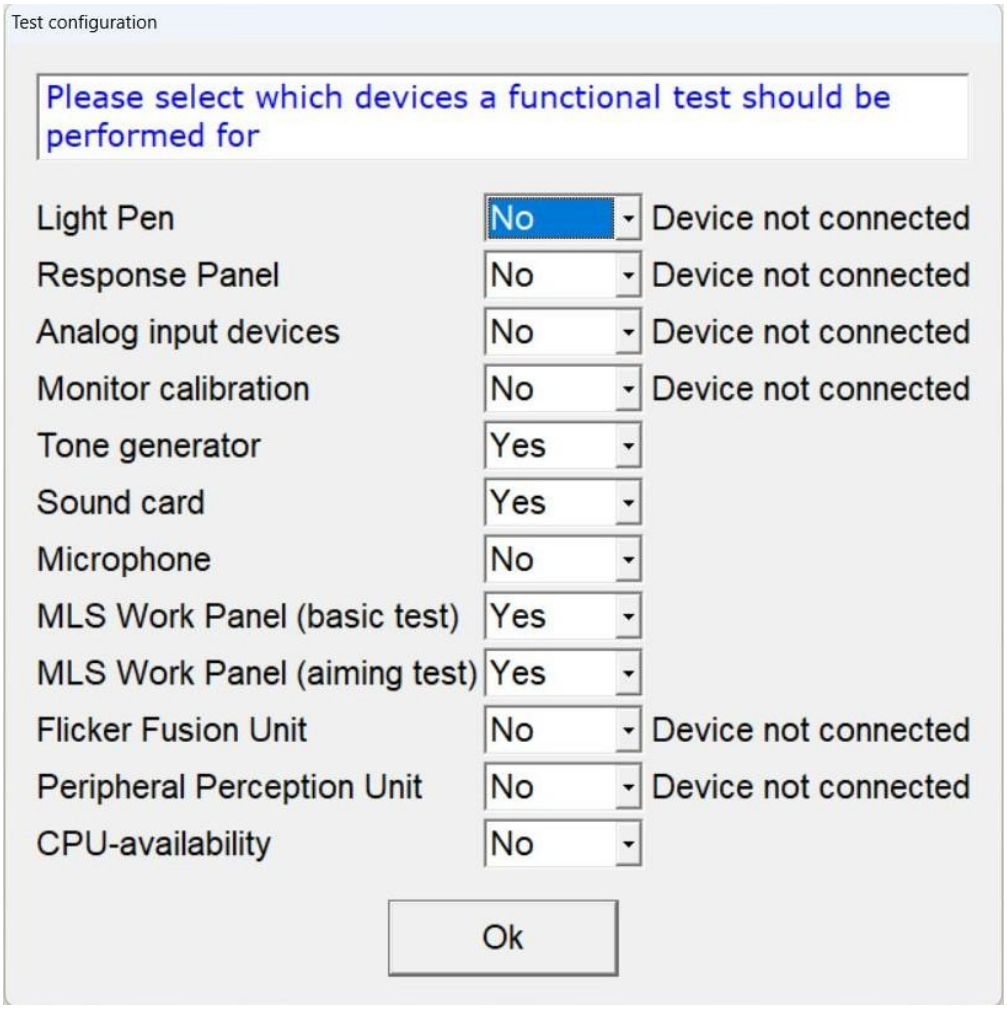
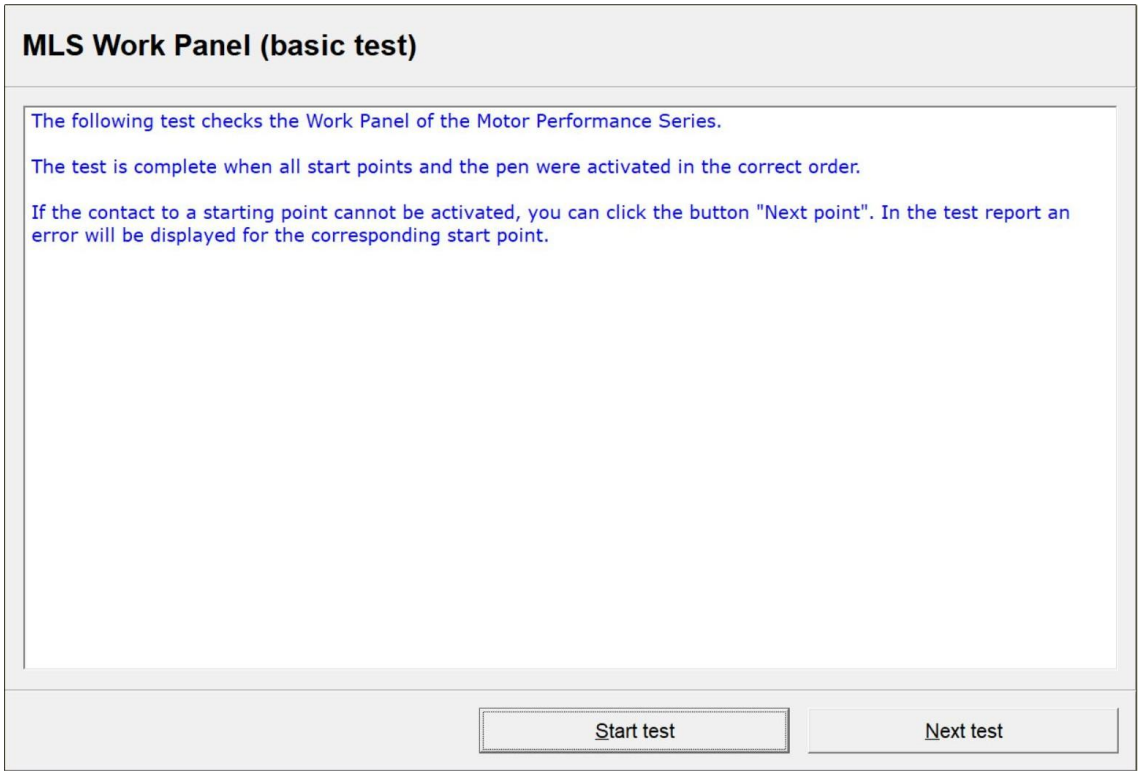


Figure 57 The Hardware Test of the VTS

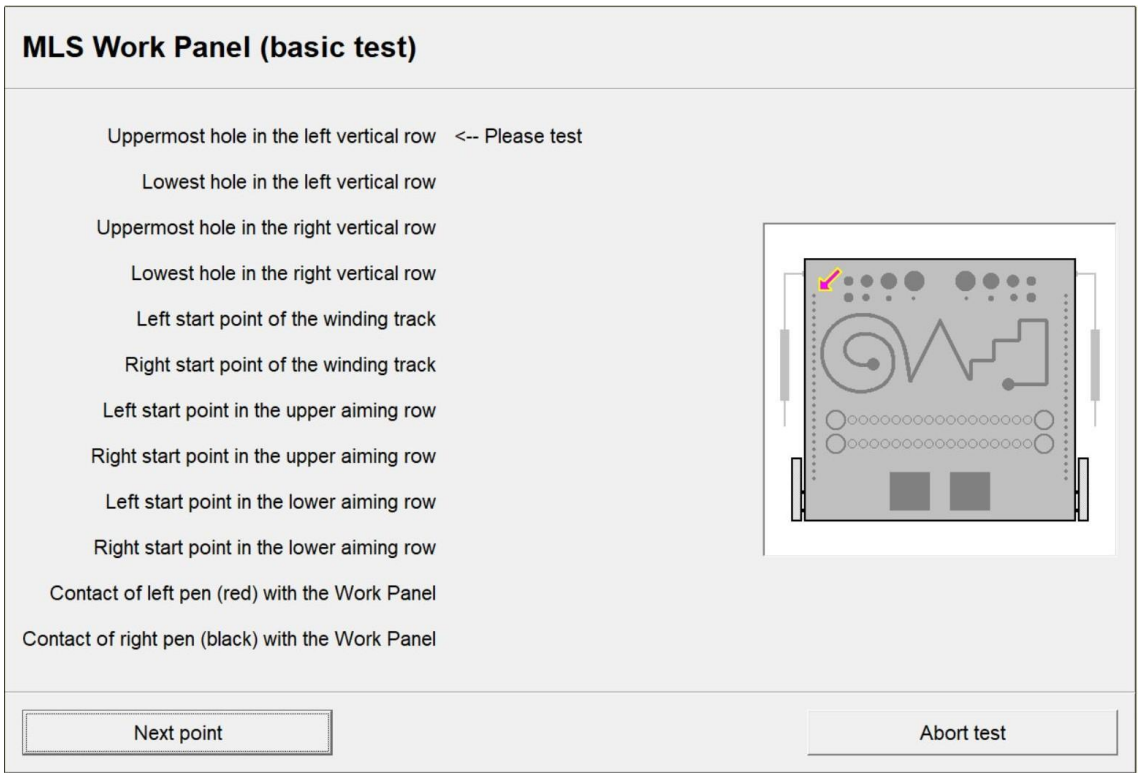
The program guides you through the test for each device. Please follow all indicated steps carefully. After completing all hardware tests, you can print a report as confirmation.

Hardware test using the example of the MLS Work Panel

1. Each test begins with an introduction explaining how to perform the test. Click on *Start test* to begin the test. If you want to skip the test, click on *Next test*.



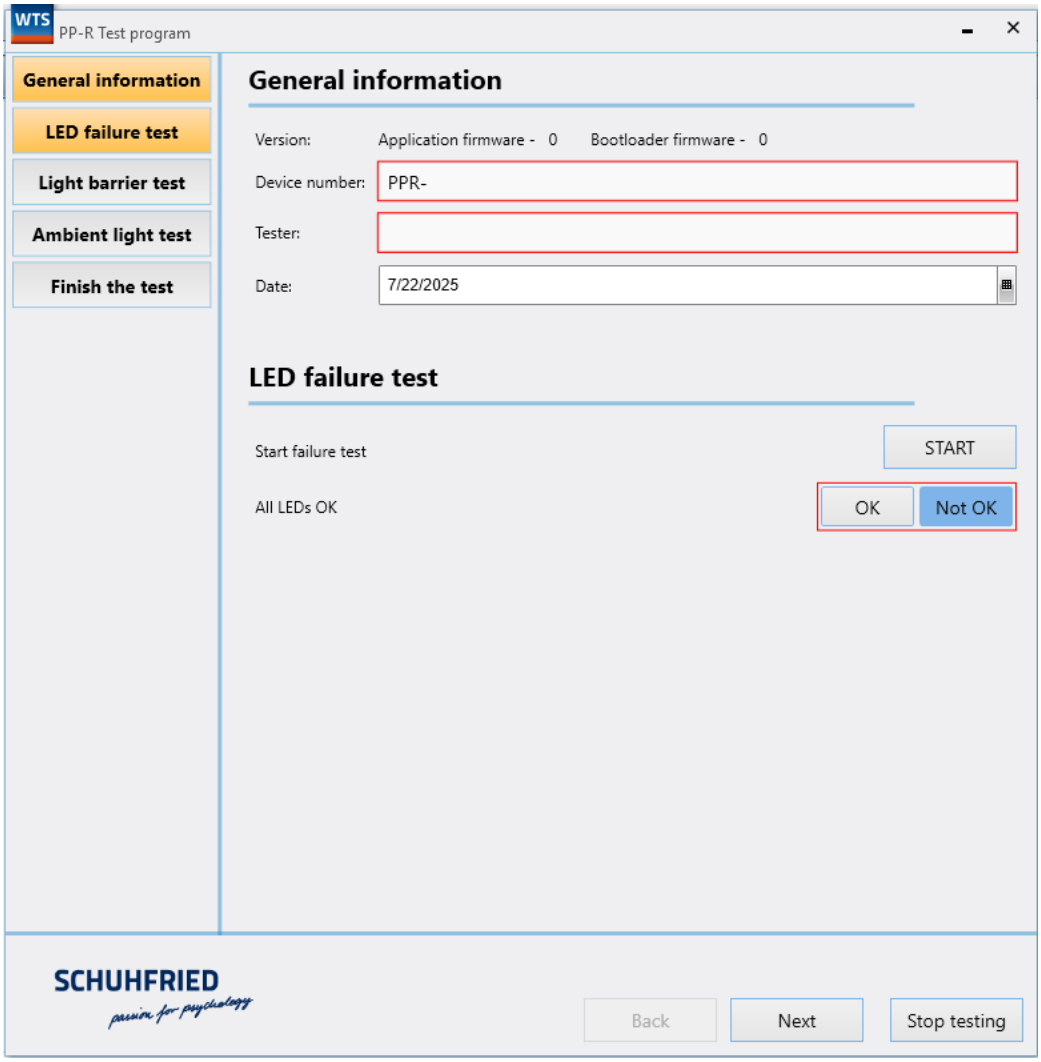
1. You will be asked to touch the sensor in selected holes on the MLS Work Panel with the pen. Once you have done this, you must touch a few more contact points with the pen. If a contact point does not respond, click on “Next point” to skip that point. Points that have not been completed will be noted in the report.



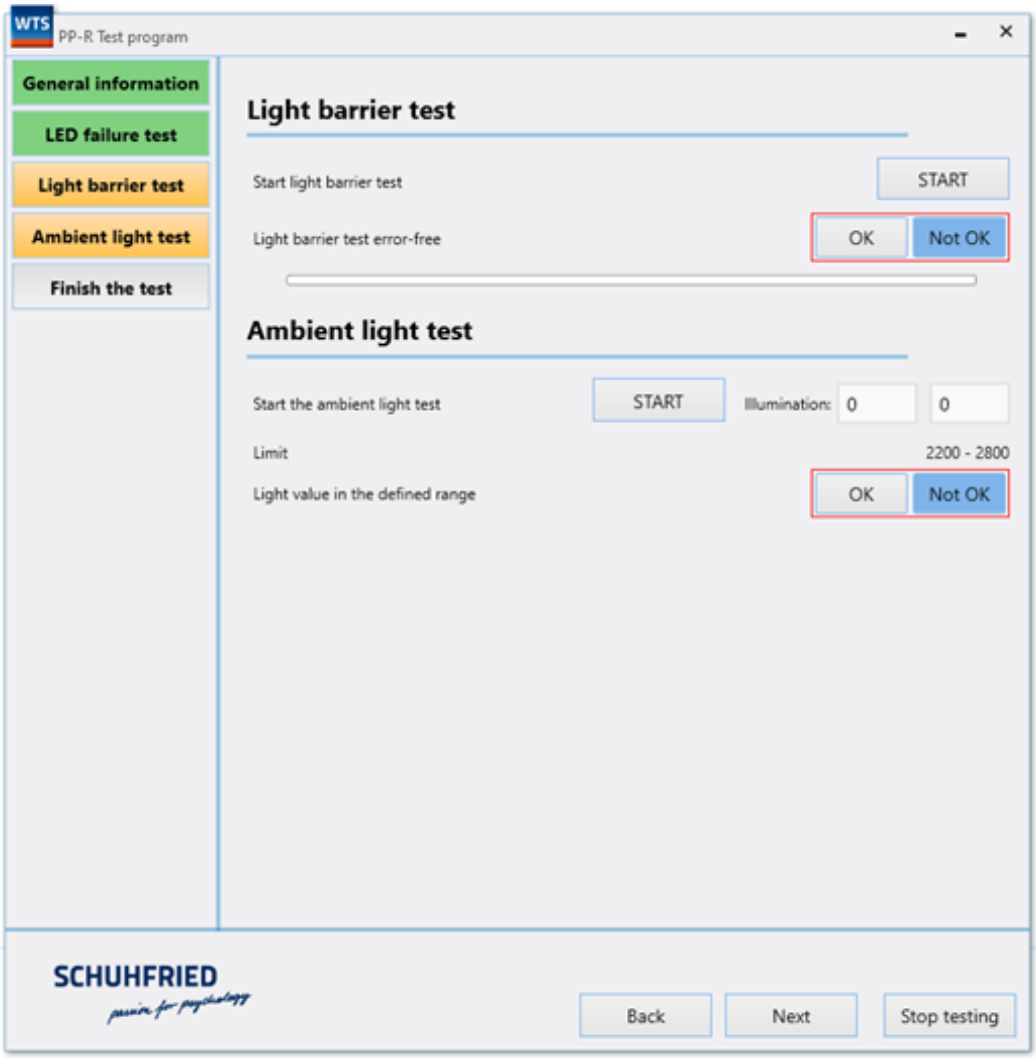
1. After the test has been completed, click “Conclude test” to finish it. The test for the next hardware component will then start automatically.

6.2.2.2 PP-HW2 hardware test

After starting the PP-HW2 hardware test, you will be asked to enter the HW device number and the person performing the test. The device number can be found on the device label on the back side of the LED-panels of the PP-HW2.



Perform the test step by step by clicking on *START* for each individual test and confirm with *OK* if the results are as expected. This means that the LED-panels are working properly and the measured ambient illumination is within the specified range (specified under *Limit*).



At the end, a test report can be printed.

6.2.2.3 Troubleshooting

If a peripheral device isn't functioning properly, try the following steps to locate and resolve the problem:

- Disconnect the device and reconnect it
- Restart Windows
- Connect the device to a different USB port (the device driver may need to be reinstalled)
- Disconnect other USB devices
- Connect the device directly to the computer without a USB hub

6.3 VTS Dongle

The *VTS Dongle* or *Test System Dongle* is connected to your PC via USB and is required for licensing the VTS if you are not using a product key or software dongle. Details on the available licensing options can be found on the page: Installation and configuration.

Your VTS dongle contains all licenses for the VTS and the tests. It must remain connected to the PC at all times to use the VTS.

6.3.1 Scope of delivery

- One VTS Dongle (USB dongle)

- One set of stickers in red, green, yellow, and black (to be used with a panel, which is not part of the scope of delivery)

If you do not have a panel but the red, green, yellow, and black keys are required for testing, the computer keyboard can bes used instead if necessary:

Panel	PC keyboard
Red button	Left Ctrl or Alt or Shift key
Green button	Right Ctrl or Shift key
Yellow button	Backspace key
Black button	Space

Since some keyboards, especially on laptop computers, have an inconvenient key layout, the above alternatives are available. Select the keys that are most conveniently located and mark them with the colored stickers provided.

6.3.2 Specifications

Specifications	Value
Power supply	5V via USB port
Power consumption	max. 30mA
Max. dimensions (W/H/D)	15 x 8 x 75mm
Weight (without accessories)	9,5g
Storage temperature	-20 to 60°C
Operating temperature	10 to 30°C
Relative humidity	max. 70%, non-condensing

6.4 Panel

The newest generation of our SCHUHFRIED Panels has been available since September 2025. It includes the SCHUHFRIED **Standard Panel (SH Panel)** and the

SCHUHFRIED **Universal Panel (UH Panel).** The documentation for previous Panels is available in the archive.

The panel you need depends on the tests you want to administer. **The use of a panel (SH Panel or UH Panel) is absolutely necessary** for the following tests: COG, DT, INHIB, PP-R, RT, SIGNAL, STROOP, SWITCH, VIGIL, WAF, WAFV, ZBA.

If you also want to test eye-hand coordination with the 2HAND and SMK tests, the **Universal Panel (UH Panel) is required**.

All other tests in the VTS do not require a panel. However, many tests can still be administered using the panel to avoid switching input devices (e.g., from a PC keyboard to a panel). For more information please see: Additional requirements for specific tests.

6.4.1 Scope of delivery

- 1 panel, standard (SH) or universal (UH)
- 2 joysticks (only with UH Panel)
- 2 joystick guides (only with UH Panel)

Standard Panel (SH)

- 7 color keys, 10 number keys, 1 sensor key
- Connection options for foot-operated keys
- Connection options for foot pedals - analog
- Sound generator (speaker)
- Connection option for headphones

Universal Panel (UH)

- 7 color keys, 10 number keys, 1 sensor key
- 2 control knobs
- 2 analog joysticks
- Joystick guides
- Connection options for foot-operated keys
- Connection options for foot pedals - analog
- Sound generator (speaker)
- Connection option for headphones

6.4.2 Commissioning

Use the supplied USB cable to connect the panel to the PC that will be used for testing. The Vienna Test System (or the Testplayer) must be installed on this PC. Connect the USB cable to the USB-C port on the back of the panel and the other end to a free USB-A port on your computer.

Figure 58 Connection options for the panel from left to right: RJ-45 (currently not used), USB-A port, foot-operated keys/foot pedals, USB-C port, RJ-45 (currently not used)

The USB-C port must be used for power supply. Using the USB-A port for power supply is not possible.

6.4.2.1 Joystick guides

The joystick guides are attached to the UH Panel as shown. The joystick can be removed to make installation easier. Joystick guides are required for administering the SMK and

2HAND tests. Please refer to the test manual for details on the correct placement of the joystick guides in each test.

Figure 59 Joystick guide attached to the UH Panel

6.4.2.2 Sound output

The panel can output sound through the internal loudspeaker or through a headset (available as an accessory). The headset can be connected to the panel using the USB-A port. You can also use a USB headset by connecting it to a free USB port on the computer. Use the Windows sound output settings (in the task bar) to select the output device you want to use:

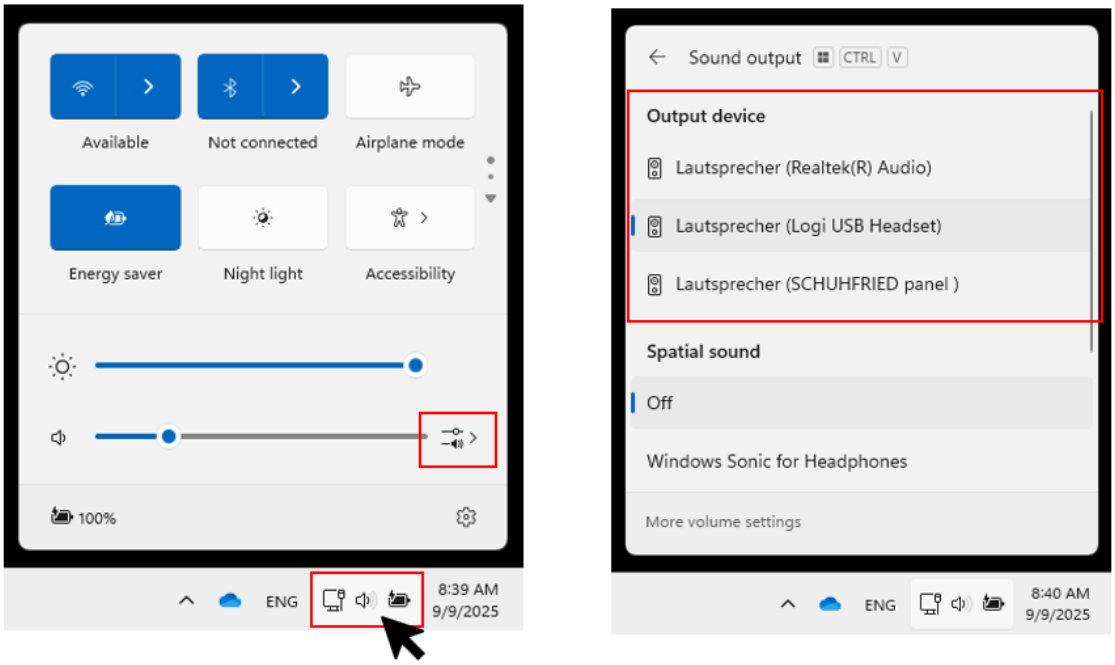


Figure 60 Selecting a device for sound output in Windows settings

When a USB headset is connected to the panel, it must also be selected as the output device in the Windows sound output settings.

6.4.2.3 Foot-operated keys and foot pedals

Foot-operated keys or foot pedals (available as accessories) can be connected via a single connection port. Connect the foot-operated keys or foot pedals as required.

6.4.2.4 Specifications

Specifications	Value
Power supply	+5V DC via the USB cable
Power consumption	max. 500mA
Protection class	
Device type	B
Max. USB cable length	3m
Max. headset cable length	3m
Max. dimensions (W/H/D)	41 x 4 x 20cm
Weight (without accessories)	1,25 kg
Storage temperature	-20 to 60°C
Operating temperature	10 to 30°C
Relative humidity	max. 70%, non-condensing

6.5 Foot-operated keys and foot pedals

6.5.1 Foot-operated keys

The foot-operated keys connect to the back of the panel.

6.5.1.1 Scope of delivery

One pair of foot-operated keys (left & right)

6.5.1.2 Specifications

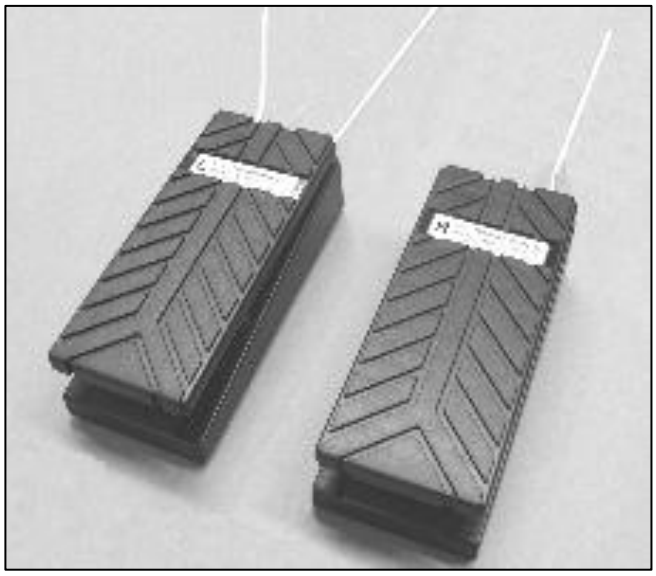
Specifications	Value
Max. dimensions (W/H/D)	160 x 55 x 310mm each
Weight (without accessories)	1,55kg
Storage temperature	-20 to 60°C
Operating temperature	10 to 30°C
Relative humidity	max. 70%, non-condensing

6.5.2 Foot pedals - analog

The analog foot pedals are connected to the Universal Panel (Ug panel).

6.5.2.1 Scope of delivery

One pair of foot pedals – analog (left and right)



6.5.2.2 Specifications

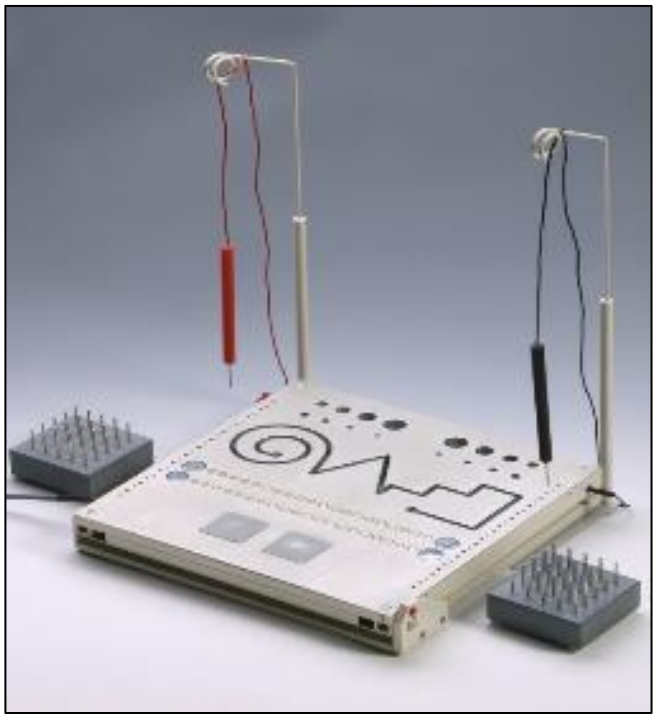
Specifications	Value
Max. dimensions (W/H/D)	80 x 60 x 200mm each
Weight (without accessories)	0,85kg
Storage temperature	-20 to 60°C
Operating temperature	10 to 30°C
Relative humidity	max. 70%, non-condensing

6.6 MLS Work Panel

The MLS Work Panel is a specialized peripheral device that is required for executing the MLS test in the VTS. It is only required for the MLS test which measures fine motor abilities.

6.6.1 Scope of delivery

- One MLS Work Panel
- 2 styluses (red = left, black = right)
- 2 stylus holders
- 2 pin holders with 25 pins each (short)
- 2 pin holders with 25 pins each (long)



The MLS Work Panel features:

- Holes of various diameters
- A multi-curved, milled line
- Two sets of 20 contact points
- 25 small holes on the left and right
- 2 tapping target areas

6.6.2 Specifications

Specifications	Value
Power supply	+5V DC via the USB cable
Power consumption	max. 500mA
Protection class	
Device type	B
Max. dimensions (W/H/D)	310 x 50 x 300mm
Weight (without accessories)	5,4kg

Specifications	Value
Storage temperature	-20 to 60°C
Operating temperature	10 to 30°C
Relative humidity	max. 70%, non-condensing

6.7 Peripheral Perception Unit 2 (PP-HW2)

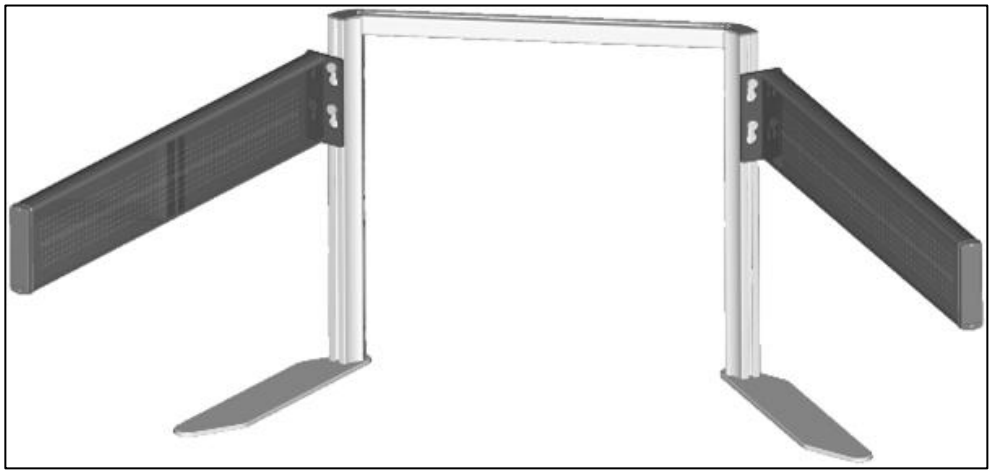
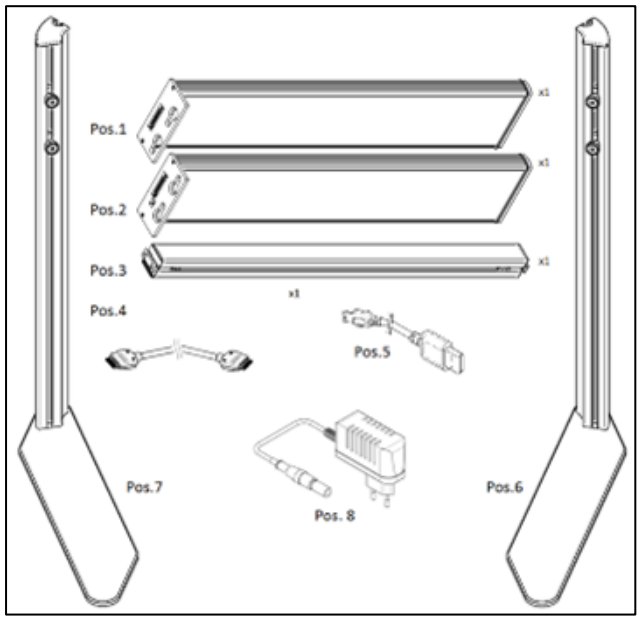


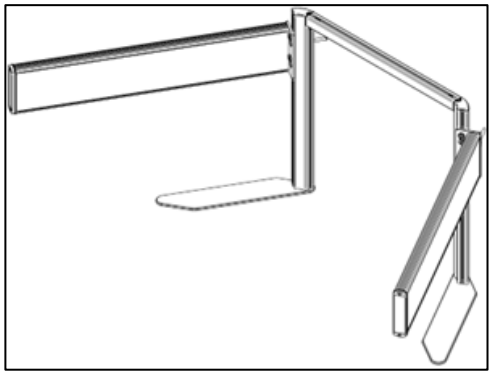
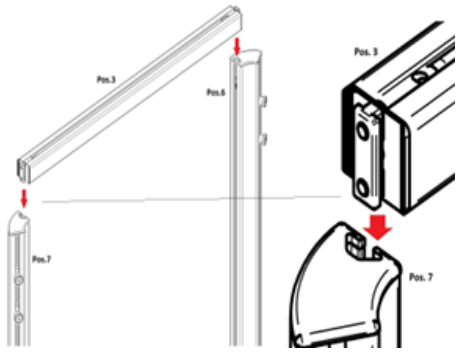
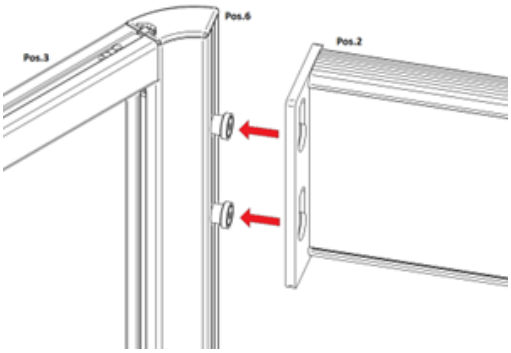
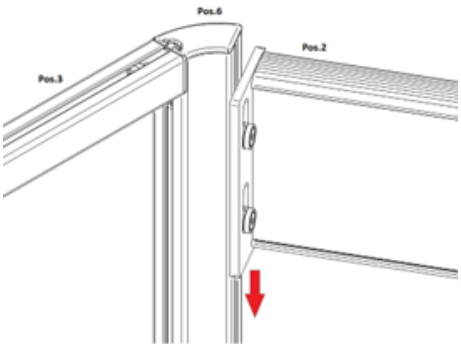
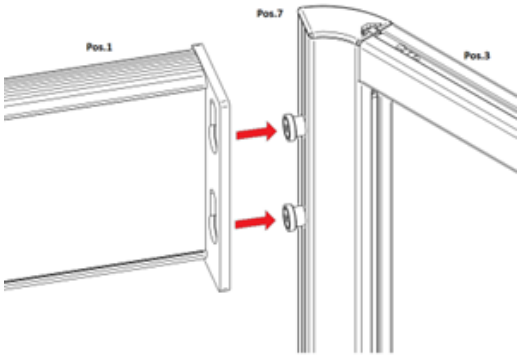
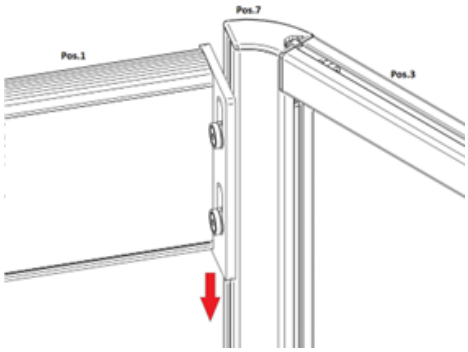
Figure 61 The Peripheral pPerception Unit 2 (PP-HW2), fully set up

The Peripheral Perception Unit 2 (PP-HW2) is a specialized hardware equipment needed to execute the PP-R test in the VTS. It is only required for the PP-R test which measures perception and processing of peripheral visual information.

6.7.1 Scope of delivery

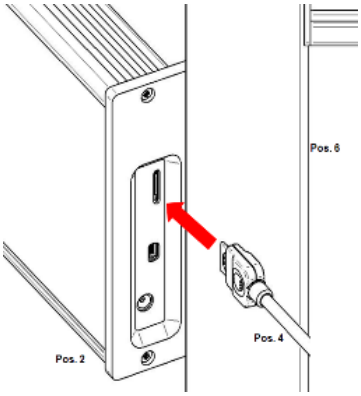
Pos.	Qty.	Description	
1	1	Left display element	
2	1	Right display element	
3	1	Crossbar	
4	1	Connecting cable 20pins/1m	
5	1	Connecting cable USB/3m	
6	1	Right pedestal	
7	1	Left pedestal	
8	1	Switching power supply 5V/4A	

6.7.2 Mechanical assembly

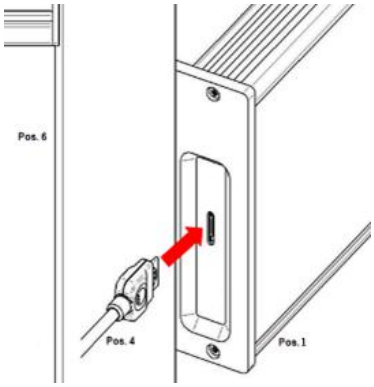
Goal	1. Attach the crossbar to the pedestals.
	
1. Attach right display element to the pedestals.	1. Lock right display element in place.
	
1. Attach left display element to the pedestals.	1. Lock left display element in place.
	

6.7.3 Cabling

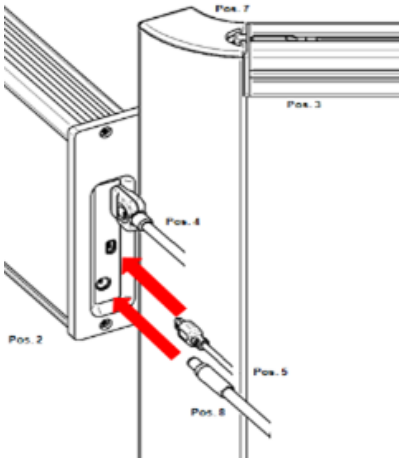
1. Attach cable to right display element.	1. Attach cable to left display element.

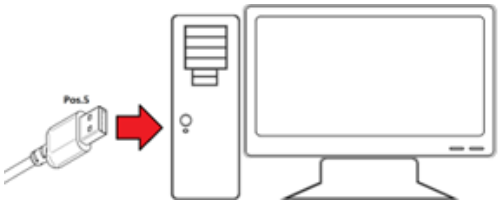


1. Attach USB cable and power supply.



1. Connection to a computer via USB cable.





The device may only be used with the parts included in the scope of delivery!
Only the enclosed switching power supply from *CINCON ELECTRONICS CO., Ltd.* with the type designation *TR30RAM050* may be used!

Before using the device, the cables must be connected. First connect the two display elements (Pos.1 and Pos.2) with the connecting cable provided (Pos.4). The jack on either end of the connecting cable can be plugged into either the left or right display element. See steps 1 and 2. Then connect the USB cable (Pos.5) to the right display element (Pos.2) and the computer (steps 3 and 4).

Power is supplied via the power adapter provided (Pos.8), which is also connected to the right display element (Pos.2) (see step 3). The power adapter (Pos.8) must also be plugged into a mains socket.

To disassemble the device, follow the cabling instructions in reverse order.

Place the test taker's monitor between the Peripheral Perception display elements so that the front of the monitor aligns evenly with the frame holding the display elements.

6.7.4 Specifications

Specifications	Value
Operating voltage	5V / 4A

Specifications	Value	
Power	20W	
Protection class	I	
Device type	B	
Max. dimensions (WxHxD)	1450 x 560 x 800 mm	
Weight (without accessories)	9,6kg	
Storage temperature	-20 to 60°C	
Operating temperature	10 to 30°C	
Relative humidity	Max. 70%, non-condensing	
Switching power supply	Manufacturer:	CINCON Electronics Co., LTD.
	Model:	TR30RAM050
	Output:	5V DC 4.0A

6.7.5 Requirements for the test setting

The test setting should allow the test taker to complete the test without disturbances, including those caused by visual and auditory stimuli.

The ambient brightness must not exceed 2500 lux, as otherwise the contrast between the stimuli presented and the ambient brightness will be too low. At levels higher than this there will be insufficient contrast with the stimuli presented in the test. If the ambient brightness is greater than 2500 lux, it should be reduced.

The ambient brightness is measured by a special brightness sensor in the PP-R hardware. If it is too high, the system prevents the test being administered.

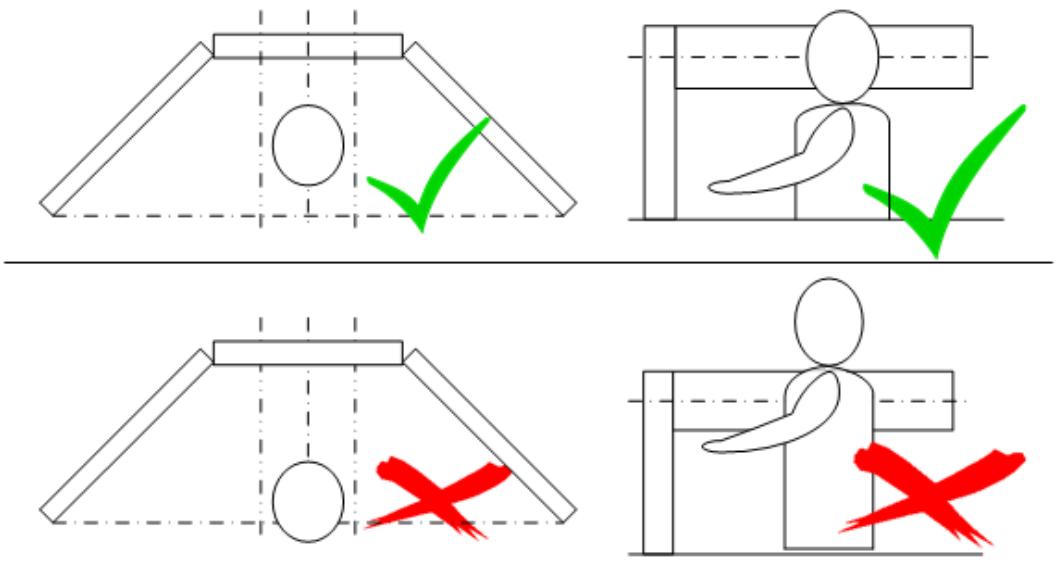
6.7.6 The test taker’s position

The test taker should sit as described under Ergonomic requirements for the workstation. It is important that the test taker's head is positioned between the two display elements. The head should align with the white markings in the middle of the sensor bars. This allows the device to determine the position of the head.

The **distance** between the metal frame and the face **must be between 20 and 45** cm. This distance is measured by the PP-R hardware. If this condition is not met, feedback is provided by the Vienna Test System.

The lateral distance between the head and the center of the screen should be no more than 10 cm. This distance is also measured by the PP-R hardware. If this condition is not met, feedback is provided by the Vienna Test System.

The correct (and incorrect) sitting position is shown schematically in the figure below. To better adjust the vertical position of the display elements, there are two positions where they can be mounted. For taller people, use the upper mounting option; for shorter people (or children), the lower option is preferable.



6.7.7 Safety note

To avoid the risk of electric shock, this device must only be connected to a power supply with a protective conductor.

7 RELEASE NOTES

7.1 Version 8.30

Available from March 2026

7.1.1 What is new?

Availability: *Online* = The test/feature is available only in VTS online. *Offline* = The test/feature is available only in VTS offline. No specification: The test/feature is available in both VTS online and VTS offline.

Test/Feature	Details	Availability
New Test: M-TASK	The new M-TASK is available and assesses multitasking ability.	
New Test: PSI-2	The new PSI-2 is available as a mental health screening instrument.	
SFS Test Solutions	The Test Assistant has been renamed to SFS Test Solutions and significantly expanded and optimized: • The search functionality has been enhanced and now includes new categories such as traffic, aviation, and clinical psychology. • The sorting of batteries in the search function has been improved. • Numerous new assessments have been added, including a traffic-light system and cross-dimensional FIT values to support improved result interpretation. • Word report templates can now be created for selected assessments.	
Open Access Tests	A new test type, “Open Access,” has been integrated into the VTS. The “Open Access” tests available in the VTS are available free of charge via a special license. There are currently five “Open Access” tests available (AUDIT, DUDIT, GAD-7, PHQ-9, PID5BF+M).	
User registration	The process for inviting new users to existing environments has been improved. VTS online now automatically sends an invitation email to the newly created user. Registration in the Marketplace is no longer required, allowing users to access VTS online immediately after account creation. Security has also been enhanced: administrators can now specify the user’s email address, ensuring that only the intended user can access the environment.	Online
Hardware Test	A new VTS Hardware Test is available for the VTS portal. This hardware test allows you to verify that the panel (including rotary knobs and joysticks), foot keys, foot pedals, and audio output are functioning correctly. The new VTS Hardware Test can be run directly from the menu under “Applications”.	

Test/Feature	Details	Availability
Technical Documentation and Help	The online platform for Technical Documentation and Help has been improved and expanded to better support users.	
VTS Analytics	VTS Analytics was extended with new functions, for example a new page to compare test results of multiple persons. Additionally, many features have been improved, like the calculation of the RCIs.	Online

7.1.2 What was improved?

Availability: *Online* = The test/feature is available only in VTS online. *Offline* = The test/feature is available only in VTS offline. No specification: The test/feature is available in both VTS online and VTS offline.

Test/Feature	Details	Availability
REST API	The REST API has been expanded with new endpoints to support broader integration and improved data access.	
Universal Plugin	The Universal Plugin of the VIS is no longer started by default to prevent unintended execution.	Offline
User Interface	It is now possible to set the extended options for selected tests (e.g., CORSI, TOL-F, etc.) also in the VTS portal.	
User Interface	The filter options on the “Persons” and “Results” tabs have been expanded. In addition, options for hiding sensitive information have been added as well as the login pages have been updated to the latest design.	
User Interface	Numerous UI/UX improvements have been made to the VTS portal. These include enhanced functionality, instructions for input devices, optimized search and filter functions, and updated designs for user and environment settings pages.	
User Interface	Input device settings and instructions were improved, simplified and introduced in VTS portal.	
User Interface	It is now possible to rename an environment and modify user names.	
User Interface	The email template editor has been improved to support languages that are written from right to left (e.g., Arabic, Farsi, etc.).	
User Interface	Users creating an account in VTS online can now provide a company name during registration, allowing the account to be correctly named after the company.	Online
Data management	Personal data can now be exported from the VTS portal as CSV and PDF files. Exports are available in table format, as a list of personal details, and as an ID export for Direct Testing.	
Data management	The management of the “Department” field for persons and users has been revised, and the assignment of persons and users to departments has been optimized.	
Data management	The automatic updating of results when personal data changes has been improved and simplified.	

Test/Feature	Details	Availability
Data management	The performance of loading and opening test results has been improved.	
Data management	Exported results from the VTS are now compressed to optimize storage usage. This applies to newly generated results.	Offline
VTS Administration Software	Technical improvements now provide more consistent feedback in the test player and simplify the process of starting tests in the portal.	
VTS Administration Software	The number of signed DLLs used by the VTS has been significantly increased.	
VTS Administration Software	The licensing of individual subtests, which was available for specific, outdated tests, as well as the “conditional test battery” function, has been removed from the VTS.	Offline
VTS Administration Software	The creation of new users in offline installations has been improved. Administrators now define the username and assign a temporary one-time password, which users must change upon first login. New users no longer need to complete a separate registration step and can sign in immediately.	Offline
VTS Administration Software	The registration process for new users in offline installations configured with a custom OpenID Connect provider has been revised. Administrators now create the user account and define the user’s email address directly. Newly created users can sign in immediately via their identity provider, without the need for a separate registration step.	Offline
Installation	The TeamViewer binary previously included in the installation package has been replaced with a link to the official TeamViewer website, ensuring that customers always download and use the latest version.	Offline
Installation	SQL Express 2022 is now delivered by default. When updating older VTS installations that use previous SQL Express versions, the SQL Server is automatically upgraded to version 2022.	Offline
Installation	The names of the applications and desktop shortcuts installed on an offline system have been updated and are now “Vienna Test System”, “VTS Test Player,” and “VTS Hardware Test.”	Offline
Test Generator	In the Test Generator, an additional text field can now be displayed above the matrix on pages with matrix input.	

7.1.3 What was fixed?

Fixed in: *Offline* = The bug only affected the test/feature in VTS offline and has been fixed there. *Online* = The bug only affected the test/feature in VTS online and has been fixed there. No specification: The bug affected the test/feature in VTS online and VTS offline and has been fixed.

Test/Feature	Details	Fixed in
HTML tests	Under certain circumstances, pages in browser-based tests could be randomly skipped. This issue has been resolved.	

Test/Feature	Details	Fixed in
SFS Test Solutions	Some batteries from the SFS Test Solutions displayed additional, optional dimensions when the battery was to be edited using the “Configure” button. The problem has been fixed.	
ATAVT-2	In the ATAVT-2 test, a blank column could appear before the variable names in the scoring under certain circumstances. This problem has been fixed.	
BMT	In the BMT test, the reliability had previously been set to a fixed numerical value instead of being based on the AdaptManager’s estimates. This problem has been fixed.	
Adaptive Tests	The calculation of confidence intervals for adaptive tests has been improved.	
FCB5	In the FCB5 Word report, certain text blocks from test form S2 were incorrectly shown for test forms S1 and S3 as well. This problem has been fixed.	
INT	In the Logical Reasoning subtest of the INT, the item pool contained several items with more than one correct answer. These items have been removed from the pool.	
INT	Under certain circumstances, the name of the norm sample based on age was not displayed correctly in the INT test. The problem has been fixed.	
LAT	In the LAT test, it was possible outside the practice example for the test administration window to appear if too many errors were made. The problem has been fixed.	
MECH	In the MECH test, data sets in the VTS data format (.xstp) could not be exported or imported successfully. This problem has been fixed.	
TACO	In test forms S5 and S6 of the TACO test, no data was saved when the test was aborted with data storage using ESC+F5 or ESC+E. This problem has been fixed.	
TMT-L	In the TMT-L test, test form S2, part B, two instruction pages were displayed in the wrong order. The problem has been fixed.	
SIMKAP	In the English version of the SIMKAP test, an error in the Questions Baseline subtest has been corrected.	
CFD	Under certain circumstances, the CFD test set in VTS online displayed the standard instructions instead of the test-administrator-supported instructions. This issue has been fixed.	Online
INSBAT-2	In VTS online it was not possible to run the INSBAT-2 test via Direct Testing if certain settings were made in the extended options. This issue has been resolved.	Online
Testing	Under certain circumstances, when assigning a test battery to persons, no warning was displayed if individual tests were not available in the language required for the test battery. The problem has been fixed.	
Testing	When testing via invitation links in VTS online was interrupted for a longer period, the total working time was displayed incorrectly in the test result. This problem has been fixed.	Online

Test/Feature	Details	Fixed in
Testing	When filters were applied on the *Testing* tab, tests that were no longer shown in the list because of the filters could still be added to the test sequence. This error has been fixed.	
Word Reports	Under certain circumstances, Word report templates were not updated to latest version during a VTS update. This problem has been fixed.	
Data management	Entries in the table on the *Persons* tab were not updated immediately after editing a person's data. This problem has been fixed.	
Email templates	Email templates edited with the editor contained non-breaking spaces instead of regular spaces. This caused formatting issues in emails. This issue has been fixed.	
Results	Under certain circumstances, the PDF with the test result did not load when the test sequence included a combination of a test set and additional tests. Users had to reopen the result to load the PDF. This issue has been fixed.	
User management	In VTS online, an issue was fixed where a deleted user continued to appear as logged in and therefore consumed a license.	Online
User management	On VTS offline systems configured with a user-defined OpenID Connect provider, it could happen that logging in to the old VTS AdminClient was not possible. This error has been fixed.	Offline
Installation	During the VTS installation, it was possible to select a license file that had been copied from another computer. The license check detected this duplicated license, causing the installation to fail. This has been fixed by preventing copied licenses from being selected during installation.	Offline
Installation	Updating to a higher VTS version was not possible if the system contained a test battery with defined abort conditions for certain tests (e.g., ATAVT, AMT). This issue has been resolved.	Offline

7.1.4 New Translations

Test	New languages
ATAVT-2	Spanish (es-ES) Italian (it-IT) French (fr-FR)
M-TASK	English (en-US) Spanish (es-ES) Italian (it-IT) French (fr-FR) Dutch (nl-NL) Swedish (sv-SE)
MECH	Spanish (es-ES) Italian (it-IT) French (fr-FR)

Test	New languages
PSI-2	English (en-US)

7.1.5 Norms

Change: *Update* = An existing norm has been updated with new data. *New* = New norm data has been added or an old norm has been replaced.

Type: *Rep* = Representative norm sample. *Conv* = Norm based on a convenience sample.

Segmentation: *Total* = No segmentation in sub groups based on demographic criteria. *Gender* = Separate norms available for men and women. *Age* = Separate norms available for different age groups. *Education level* = Separate norms available for different education levels.

Test	Test Form	Norm Nr.	Change	Type	Norm name	Size (N)	Data collection	Segmentation
TACO	S1	1000-1003	Update	Rep	Representative norm sample	586	2020; 2025	Total, gender, age, education level
M-TASK	S1	1000-1003	Neu	Rep	Representative norm sample	316	2025-2026	Total, gender, age, education level
PSI-2	S1	1000-1003	Neu	Rep	Representative norm sample	331	2026	Total, gender, age, education level
PSI-2	S1	5050	Neu	Rep	Representative norm sample - USA	1046	2006-2007	Total

7.2 Overview of changes per test

7.2.1 Adaptive Tachistoscopic Attention Test (ATAVT-2)

8.30

The test is now available in Spanish, Italian and French. An error in the scoring was fixed, where it could happen that a blank column appears before the variable names.

8.29

The test was released in German and English as the successor for the ATAVT test with a representative norm sample (N = 338).

7.2.2 Adaptive Working Memory Test (SPAN)

8.26

The test was released in German and English with a representative norm sample (N = 316).

7.2.3 Basic Matrices Test (BMT)

8.30

The reliability (used for confidence interval calculation) was set to a fixed numerical value instead of the reliability estimated by the Adapt Manger. The problem has been fixed.

8.29

BMT is now available in Portuguese.

8.19

BMT is now available in Arabic and Turkish.

8.17

The test was released in English, German, French, Dutch and Polish with a representative norm sample (N = 357)

7.2.4 Big Five Test with Forced Choice (FCB5)

8.30

In the Word report for the FCB5 test, individual text blocks from test form S2 were incorrectly displayed for test forms S1 and S3 as well. The problem has been fixed.

8.29

FCB5 is now available in Arabic.

8.26

FCB5 is now available in Hungarian and Portuguese. A variable description was corrected.

8.25

FCB5 is now available in French and Polish.

8.24

The test was released in German and English with a representative norm sample of N = 460 persons (test form S1, S2, S3).

7.2.5 Cognitrone (COG)

8.29

For test form S11, a new representative norm sample for Slovakia was added (N = 470) was added.

8.27

For test form S11, an additional representative norm sample from China was added (N = 493).

8.23.02

The size of the reference and comparison images for the COG test differed very slightly. They have now been unified to the exact same size.

8.23

An error in the Bulgarian instructions of COG was fixed.

8.21.01

COG is now available in Ukrainian.

8.19

COG was converted to the new design & software framework of the VTS 8 (converted from the older VTS 6 version).

8.14.10

For test form S11, a new convenience norm sample (*Professional drivers - Czech Republic,* N = 178) was added.

8.13

COG is now available in Chinese.

8.11

For test forms S1 and S3, the representative norm sample was updated with new data (N_{S1} = 796, N_{S3} = 354). For test form S5, a new representative norm sample was added (N = 340).

7.2.6 Determination Test (DT)

8.29

For test form S1, the representative norm sample was updated with new data (N = 849). For test form S1, a new representative norm sample for Slovakia was added (N = 507).

8.28

For test form S4, a new convenience norm sample (*Applicants - Portugal*, N = 1140) is available.

8.27

The Czech translation has been revised. For test form S1, a new representative norm sample from China is available (N = 505). For test forms S5 and S6, the representative norm sample was updated with new data (N_{S5} = 785, N_{S6} = 685).

8.22

DT is now available in Ukrainian.

8.19

DT is now available in Norwegian.

8.18

DT was converted to the new design & software framework of the VTS 8 (converted from the older VTS 6 version).

8.17

The administration of DT test form S6 required the computer's audio settings to be confirmed even though the test form does not use any audio output. This has been corrected.

8.14.10

For test form S1, a new convenience sample (*Professional drivers - Czech Republic,* N = 179) was added.

8.14

In test form S4 of DT, the norm sample was corrected because two variables were incorrectly keyed.

8.13.10

The scoring of DT was translated into Hungarian.

8.11

For test forms S1 and S3, the representative norm sample was updated with new data (N_{S1} = 759, N_{S3} = 547). For test form S4, a new representative norm sample was added (N = 347).

7.2.7 Inventory for Testing Cognitive Abilities (INT)

8.30

Some items in the item pool of the logical reasoning subtest contained more than one correct answer. The items have been removed from the item pool. The name of the norm sample based on age was not displayed correctly under certain circumstances. The problem has been fixed.

8.29

INT is now available in Arabic, Greek and Finnish.

8.28
The item pool for the Logical Reasoning, Numerical Ability, Verbal Ability and Visual-Spatial Ability subtests has been expanded for the S2 test form. In addition, five difficulty levels (very easy, easy, medium, difficult, very difficult) are now available in the extended options for the linear and randomized forms as well as for the start (difficulty of the first item) of adaptive testing. The representative norm sample was increased to N = 614 persons.

8.24
The Long-Term Memory subtest was added to the test.

8.22.03

INT is now available in Polish.

8.22
INT is now available in Czech.

8.21
INT is now available in Italian.

8.20
INT was extended to include the Visual-Spatial Ability subtest and re-normed as part of this (representative norm sample, N = 387).

8.19
INT is now available in Norwegian. The convenience sample *Applicants (pilots) - Norway* (N = 182) was included.

8.15
The adaptive standard form (S2) of the INT has been published and the test has been translated into Hungarian.

8.14
INT is now available in Chinese.

8.13
INT was released in German, English, Spanish and French.

7.2.8 Inventory of Driving Related Personality Traits - Revision (IVPE-R)

8.29

For test form S1, the representative norm sample was updated with new data (N = 621).

8.27

The IVPE-R is now fully browser-compatible.

8.24

There was an error in the Czech version of the IVPE-R test. This error was corrected.

8.21.01

The IVPE-R is now available in Polish and Ukrainian.

8.16.01

The IVPE-R is now available in Arabic.

8.11

The IVPE-R is now available in French.

8.10.10

The IVPE-R is now available in Urdu.

8.9

IVPE-R is now available in Czech, Russian and Slovak.

8.8

The test was released in German, English, Hindi, Spanish and Italian.

7.2.9 Line Orientation Test (LAT)

8.24

For test form S1, an additional representative norm sample from Hungary is available (N = 410).

8.13.10

LAT is now available in Hungarian.

8.11

The test was released in German and English with a representative norm sample (N = 374).

7.2.10 Mouse Ability Test (MOUSE)

8.28

MOUSE is now available in Lithuanian.

8.27

For test form S1 an additional representative norm sample from China was added (N = 451).

8.26

MOUSE is now available in Greek. For test form S1, a new representative norm sample was added (N = 361).

8.25

MOUSE was converted to the new design & software framework of the VTS 8 (converted from the older VTS 6 version) and is now available in Farsi.

8.17.00

MOUSE is now available in Chinese.

8.13.10

MOUSE is now available in Hindi.

8.13

MOUSE is now available in Polish.

8.11

For test form S1 a new convenience norm sample (*Patients with schizophrenic disorders*, N = 192) was added.

7.2.11 Professional Interest and Orientation Test (PRIO)

8.23

PRIO is now available in Italian.

8.17

PRIO was released in German and English with a representative norm sample (N = 341).

7.2.12 Reaction Test (RT)

8.29

For test forms S1 and S3, the representative norm samples were updated with new data (N_{S1} = 652, N_{S3}= 1070). For test form S3, a new representative norm sample for Slovakia was added (N = 444).

8.27

For test form S3, an additional representative norm sample from China was added (N = 492). For test forms S5 and S6, the representative norm samples were updated with new data (N_{S5} = 480, N_{S6} = 355).

8.23

For test form S3, a new convenience norm sample was added (*Professional drivers - Portugal*, N = 724). For test form S6, a new convenience norm sample was added (*Applicants - Portugal*, N = 346).

8.21.01

RT is now available in Ukrainian. In the RT test, there were slightly delayed measurements in the purely auditory test forms S2 and S8 under certain circumstances. The test has been optimized and the problem has been fixed.

8.19

There was an error in the nl-NL translation of the RT test. This error was corrected.

8.16.01

Following user feedback, the Portuguese translation of RT has been revised and improved. In the RT test, there were certain circumstances in which the Testplayer window did not close properly at the end of the test. This problem has been remedied.

8.14.10

For test form S3, a new convenience norm sample was added (*Professional drivers - Czech Republic*, N = 338).

8.14.00

The RT test was converted to the new design & software framework of the VTS 8 (converted from the older VTS 6 version).

8.12

For test form S4, a new representative norm sample was added (N = 362).

8.11

For test form S8, the representative norm sample was updated with new data (N = 338).

7.2.13 Signal Detection (SIGNAL)

8.28

For test form S1, the representative norm sample was extended with new data (N = 1105). The representative norm sample is representative for the population of the DACH area up to 79 years.

8.27

SIGNAL is now available in Greek. For test forms S2 and S3, a new representative norm sample was added (N_{S2} = 348, N_{S3} = 322).

8.26.00

Scoring was translated into Chinese and Slovakian. The Portuguese translation was revised.

8.23.00

For test form S1, a new convenience norm sample was added (*Applicants Portugal*, N = 355).

8.21.01

In the SIGNAL test, it was possible for individual reactions to not be registered correctly under certain circumstances. This error has been fixed.

8.19.00

SIGNAL is now available in Norwegian.

8.17.00

The test SIGNAL was converted to the new design & software framework of the VTS 8 (converted from the older VTS 6 version).

8.13.10

SIGNAL is now available in Chinese (scoring available only in English).

8.11

For test form S1, an additional representative norm sample from Poland was added (N = 349).

7.2.14 Stroop Interference Test (STROOP)

8.28

STROOP is now available in Greek. Scoring was translated into Hugarian and Slovak.

8.27

There was an error in the Polish version of the STROOP test. This error was fixed.

8.18

The test STROOP was converted to the new design & software framework of the VTS 8 (converted from the older VTS 6 version).

8.17

STROOP is now available in Danish.

8.12

In the STROOP test the variables at item level were missing from the SPSS export. This error was fixed.

8.11

For test form S7, an additional representative norm sample for Poland was added (N = 329).

7.2.15 Test of Mechanical-Technical Comprehension (MECH)

8.30

MECH is now available in Spanish, Italian and French. It was not possible to export data records in VTS data format (.xstp) and import them successfully. The problem has been fixed.

8.29

MECH is now available in Hungarian.

8.28

The test was released in German and English with a representative norm sample of N = 306 persons (test form S1).

7.2.16 The Attention and Concentration Test (TACO)

8.30

In test forms S5 and S6 of the TACO test, no data was saved when the test was aborted with data saving via ESC+F5/ESC+E. The problem has been fixed. The representative norm sample for test forms S1 was extended (N = 586).

8.29

TACO is now available in Arabic and Lithuanian.

8.26

The test was extended with two new test forms (S5 and S6) measuring *Divided Attention.* For test forms S5 and S6 the representative norm sample (N = 302) was added.

8.22

TACO is now available in Polish.

8.20

The test was extended with two new test forms (S3 and S4) measuring *Sustained Attention.* For test forms S3 and S4 the representative norm sample (N_{S3} = 325, N_{S4} = 317) was added.

8.19

TACO is now available in Norwegian. The convenience sample *Applicants (Pilots) - Norway* (N = 182) was added.

8.15

TACO is now available in Hungarian.

8.14

The TACO test was first released in German, English, French and Spanish with a representative norm sample of N = 479.

7.2.17 Trail Making Test - Schuhfried Version (TMT-S)

8.26

The TMT-S was released in German and English with a representative norm sample (N = 304) and two test forms (S1 and S2).

7.2.18 Two-Hand Coordination (2HAND)

8.29

For the test form S4, the representative norm sample was updated with new data (N = 601).

8.28

The 2HAND is now available in Lithuanian.

8.27

For the test form S1, the representative norm sample was updated with new data (N = 780). For the test form S6, a new representative norm sample was added (N = 326).

8.26

The Portuguese translation of the test was revised.

8.23

For the test form S3, a new convenience norm sample (*Professional drivers - Portugal*) is available (N = 3424).

8.22.03

The 2HAND is now available in Ukrainian.

8.13.10

The test 2HAND was converted to the new design & software framework of the VTS 8 (converted from the older VTS 6 version).

8.12

For the test form S5, the representative norm was updated with new data (N = 313).

8.11

For the test form S4, the representative norm was updated with new data (N = 545).

7.2.19 Vigilance (VIGIL)

8.26.00

Scoring was translated into Chinese. The Portuguese translation was revised after feedback.

8.19.00

VIGIL is now available in Norwegian.

8.17.00

The test VIGIL was converted to the new design & software framework of the VTS 8 (converted from the older VTS 6 version). For test forms S1 and S2 the representative norm samples were updated with new data (N_{S1} = 611, N_{S2} = 738).

8.13.10

VIGIL is now available in Chinese, the scoring is available only in English. The scoring was translated into Hungarian.

7.2.20 Multitasking Test (M-TASK)

8.30

The test was released in English, Spanish, Italian, French, Dutch and Swedish with a norm sample representative for the DACH area (N = 316).