Installation
&
Getting Started

Welcome

Dear Zahner User,

Thank you very much for choosing a Zahner electrochemical workstation of the Zennium family. You made your decision for an instrument that is known for its reliability, accuracy, and exceptional performance. As Zahner R&D is always in touch with scientists and engineers at universities and industries, our products are practice-oriented and user-friendly.

An electrochemical workstation is a complex instrument with a multitude of methods and functions. Therefore, it is very important to read this manual carefully. Only this way you can be sure to get the most out of your instrument. The manual guides you through the installation process and introduces you to all methods provided by the Thales software. If there remain open questions after reading this manual, you are welcome to contact your Zahner distributor or the Zahner service team with specialists in battery & fuel cell, photo-electrochemistry, corrosion research, and many other fields of electrochemistry. Our support team will certainly be able to help you with your instrument as well as with your application.

We wish you a lot of success with your new Zahner workstation.

Your Zahner Team

1. General Safety Information

Before installing the instrument, please read this information carefully for your safety and the safety of your system. In the following, we refer to the workstations Zennium-X, Zennium-pro, Zennium-XC, as ***Zennium-ECW*** (ElectroChemical Workstation). In case only one of these models is addressed, we refer to its name explicitly.

Only authorized personnel are allowed to open Zahner devices! There are no user-serviceable parts inside. Non-insulated parts under voltage inside may cause an electric shock when touched.

Front panels must not be removed while the instrument is connected to the main power source. Before removing a front panel, switch off the device and disconnect it from the main power supply. Extension cards are installed to the extension slots to the right-hand side of the ***Signal Processor*** module.

Signal Processor Module   **Expansion Card Slots**

Please strictly follow all instructions written on the *Zennium-ECW* case, on tags attached to the case, and in the manuals for your safety and the safety of your system. Especially, strictly observe the following:

!   **Connect the *Zennium-ECW* only to the main power supply shown on the main plug/fuse holder on the backside of the instrument cabinet!**

!   **If the system is not used for a long time, then the main power supply should be disconnected!**

!   **The system must be protected from water or any other liquid and humidity above 65%!**

!   **Do not operate the instrument at an environmental temperature higher than 40° C!**

!   **Never place the system close to a heat source!**

!   **Always place the system in a position that allows sufficient ventilation through all ventilation openings. Never place the system on top of a soft base!**

!   **Do not clean the system with aggressive agents or with hard objects!**

!   **In case of communication problems deactivate all power-safe modes (USB, hard disk, screen, etc.) and screen-savers on the instrument computer, use the high-quality USB cable shipped with the ECW, and forego the use of USB extensions and hubs!**

!   **Do not open the devices. There are no user-serviceable parts inside!**

!   **Disable all third party anti virus software. Windows Defender of Windows 10 may stay active, but requires exceptions of the on-access scanner for the folders c:\flink and c:\thales!**

This device consumes, produces, and radiates electric energy. Improper installation may cause electric disturbances on radio transmitters and receivers. Vice versa, strong emitters of electric fields may cause noise and artifacts to the instrument measurements.

IMPORTANT!

1.1 Electrostatic Discharge

Zennium-ECWs are very sensitive instruments measuring currents down to the range of fA and aA. For this purpose, they are equipped with high-precision and high-sensitive inputs. These inputs are well protected against over-voltage. Of course, this can only be done to a degree that does not affect the sensitivity of the inputs.

At dry conditions, the user can get charged electrostatically by rubbing two different materials, e.g. shoe sole and floor, trouser material and chair cover material, etc. You can feel, see and hear the discharge when touching a metallic part. An electrostatic charge on a human body can reach several thousand Volts. From such high voltages, the instrument inputs cannot be protected. Therefore, the user needs to take care of not being charged when touching the input connectors or the ends of the connected electrode lines. Discharging can be done by touching a grounded metal surface. The best solution is a grounding pad beneath your *Zennium-ECW* system which you touch before you touch the electrode inputs or electrode cables. The pad has to be grounded e.g. at the main ground.

! **Electrostatic discharge on the *Zennium-ECW* inputs can destroy the input amplifiers!**

! **Before touching electrode connectors or electrode cables, make sure that you discharged yourself by grounding.**

! **Defects caused by electrostatic discharge are not covered by warranty!**

! **Connect the electrode lines only in the following sequence:**

1. **Working electrode (WE)**
2. **Working electrode sense (WE sense)**
3. **Reference electrode (RE)**
4. **Counter electrode (CE)**

Device under test (DUTs) can be left connected while turning off or restarting the ECW. Also switching the measurement device from the main ECW to external potentiostats (via EPC42) can be done without reconnecting the DUTs.

1.2 Grounded/Floating Mode & Active Shielding

In **Grounded Mode** the **Working Electrode WE** is connected to the ground. This provides the best signal-to-noise ratio and therefore is recommended for most applications. In this mode, you have to take care that your sample is not grounded. Otherwise, you can create a ground-loop which is adding artifacts to your signal (see image below).

In **Floating Mode,** no electrode is connected to the ground. This allows the measurement of grounded samples without creating ground loops.

The electrode outlets and cables are shielded actively. That means the phase-shifted signal is applied to the shielding. This is done to minimize capacitive artifacts caused by the core and shielding of the cables. Therefore, always use the original cables shipped with the workstation and never connect the shielding of an electrode jack to the ground. This deactivates the active shielding and may damage the hardware.

Use the **TestBox** only in **Grounded Mode**. You will get erroneous data when measuring the TestBox in Floating Mode.

The 4-mm banana plug (marked in the image below) can be used to extend the grounding of the Zennium potentiostat to the Faraday cage. For grounding the Faraday cage, connect the Faraday cage with a wire and plug the wire into the 4 mm banana plug.

2. Unpacking

All *Zahner* products are carefully produced, calibrated, and tested so that they achieve their high-quality standard. Also assembling of accessories and packing are done with utmost care. Nevertheless, the system may get damaged during shipment. Therefore, we recommend checking all parts of the shipment directly after receipt for completeness. If there are obvious damages, please immediately contact Zahner or your Zahner distributor.
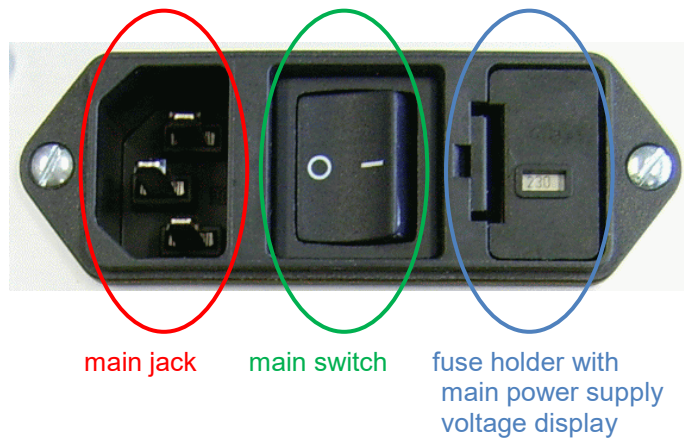
The shipment contains the following parts:

Zennium-ECW

- *Zennium-ECW*
- TestBox
- Cell cable set:
    4 BNC/banana cables (1 m)
    4 banana clips
- USB connection cable *Zennium-ECW* ⇔ PC
- Power cord
- USB stick with *ThalesXT* software suite, drivers, and Calibration data (manual cover inside)
- This manual
- 3 Zahner Analysis software licences (license code sheet in manual folder)

3. Hardware Installation

For controlling a *Zennium-ECW* system a computer with Windows 10/11 is needed.

For connecting the hardware proceed as follows:

1. Connect *Zennium-ECW* and the computer to the main power supply.
2. Connect *Zennium-ECW* port to a free USB port of the computer. (Only use HIGH-QUALITY USB EXTENSION –shipped with workstation-. Low-quality USB cable, USB extensions, and/or hubs can lead to artifacts in measurements and possible damage to device or setup under investigation).
3. Connect optional devices to the *Zennium-ECW* as described in the manual of the optional device.
4. Switch on the computer and the *Zennium-ECW.*

main jack   main switch   fuse holder with
                              main power supply
                              voltage display

3.1 Switch Main Voltage and Main Fuses

Push snap-in nose to release fuse bracket.
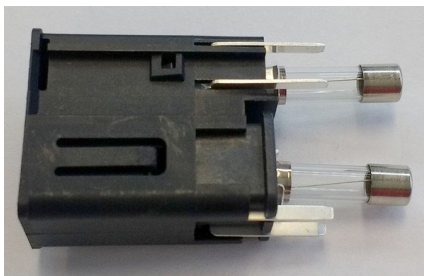
Fuses for 115V: 2x 4A T (slow)
Fuses for 230V: 2x 2A T (slow)
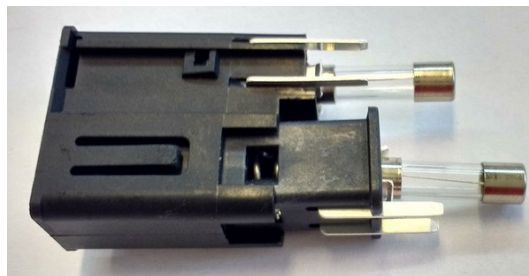
Pull tray to switch input voltage corresponding to the main voltage (115V / 230V)

The selected main voltage is visible at the fuse holder bottom

4. Software Installation

ThalesXT Software Suite is specially designed for controlling *Zennium-ECW* and analyzing the data created by the workstation. It is running under Windows 10/11 in 32 and 64-bit versions.

! **Make sure that you have full administrator access to the computer. Especially, you need access to c:\flink, c:\thales and c:\windows.**

! **Make sure that all energy management tools are deactivated.**

! **In case an IMPC was shipped with the *Zennium-ECW* workstation, do NOT install the software! The complete software suite is pre-installed and configured on the IMPC computer hard drive. In this case, *Thales* USB pen drive is used as backup only.**

! **Thales can handle only 12 drive letters of your PC file system. If you have got more, the first 12 drive letters are accessible whereas the rest will be ignored. You can access floppy disk, hard drive, DVD/CD-ROM, and network drives.**

4.1 ThalesXT Installation

Insert the **ThalesXT USB** pen drive to the USB connector and run **setup.exe** from the root directory of the USB. You can also download the Thales software from www.zahner.de. and run **ThalesXTx.x.x_Setup.exe**.

The first window lets you select the optional functions you want to install. For installation, select the option **Thales Software and Calibration Data**" and click **Perform**.

Select software modules to be installed

When updating an existing Thales software version you can keep older versions
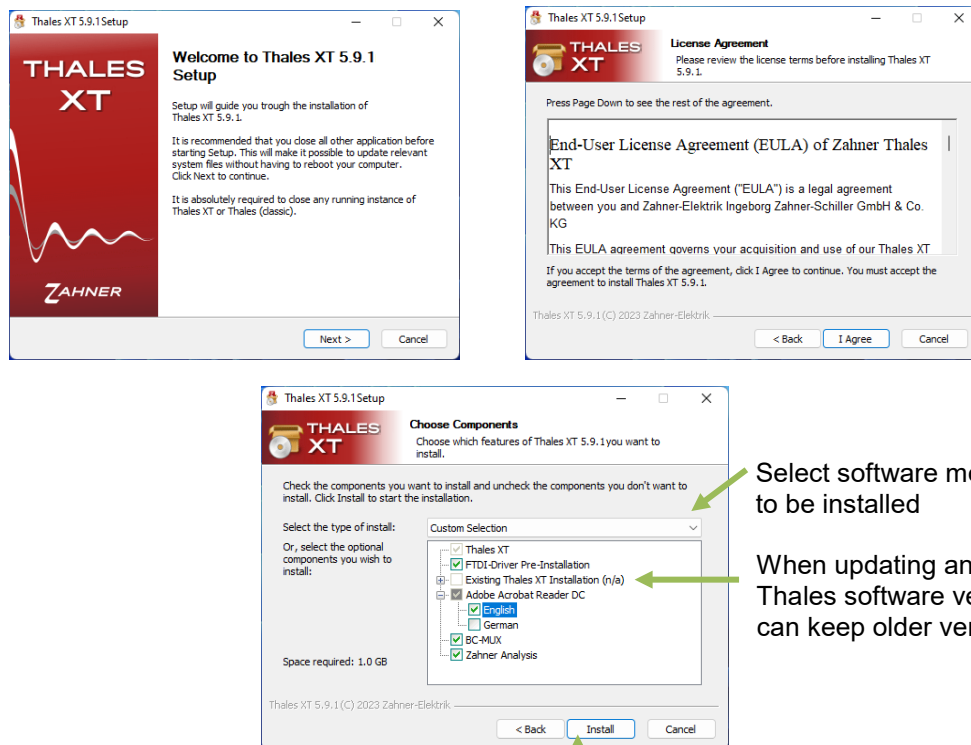
After choosing the preferred software modules for installation, click on the **Install** button. This will start the installation process.

Follow the instructions on the screen as follows:

During the installation the folder c:\flink and c:\thales are created and files will be copied from the installer to the c:\ partition of the PC.

USB device drivers will be installed when option is checked.
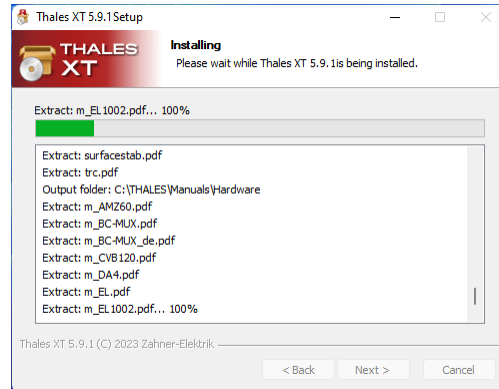
After the installation of Zennium, the installation of some other essential softwares start automatically. A list of these softwares are given below

- **Adobe Acrobat DC Reader:** Needed for displaying online-help
- **BC-Mux:** Add-Ons for high-power DC test systems
- **Zahner Analysis**

Adobe Acrobat Reader DC installation:

Installation of Adobe Acrobat Reader DC starts automatically.
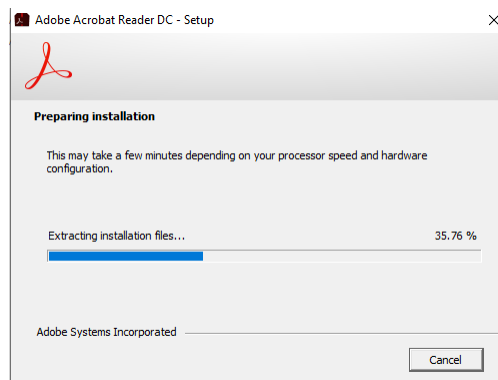
Installation of Adobe Acrobat Reader DC is finish.
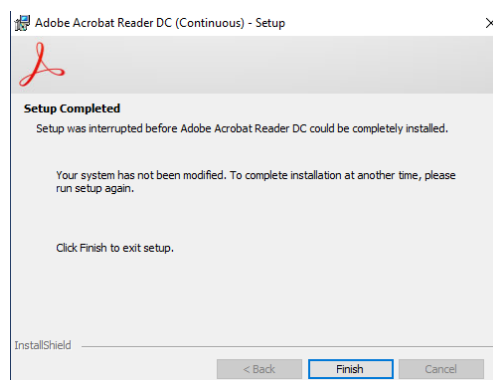
BC-Mux installation:

Choose the destination location for installation of BC-Mux.
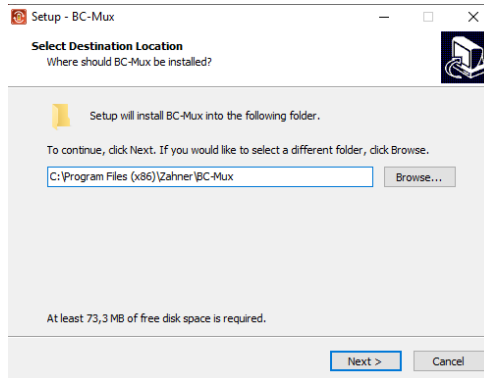
Click **Install** to start the installation of BC-Mux.
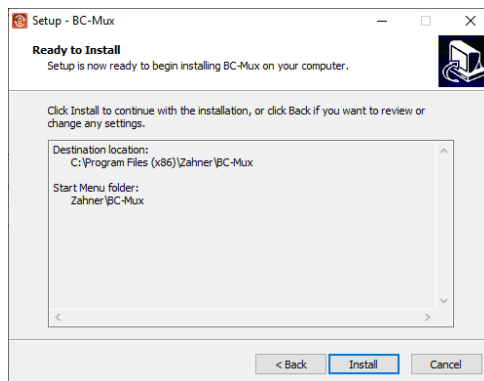
With this step the installation process finishes, click **Finish**.
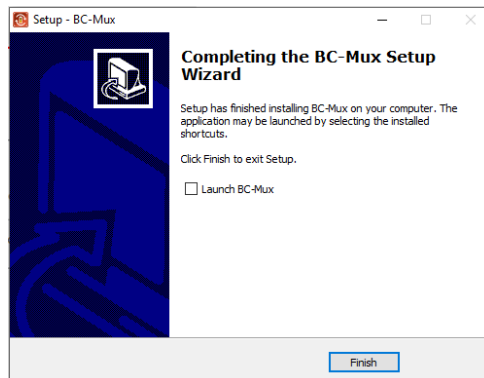
Zahner Analysis installation:

The installation of **Zahner Analysis** starts automatically.
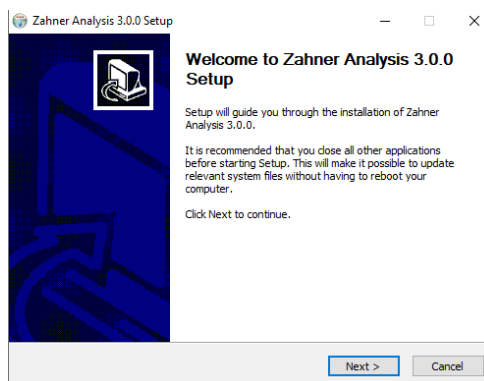
Select the desired file types
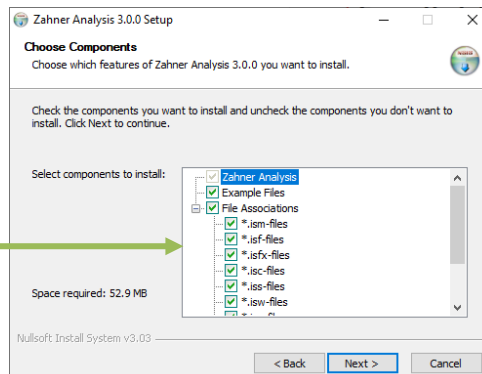
Choose the destination folder for installing the **Zahner Analysis**.
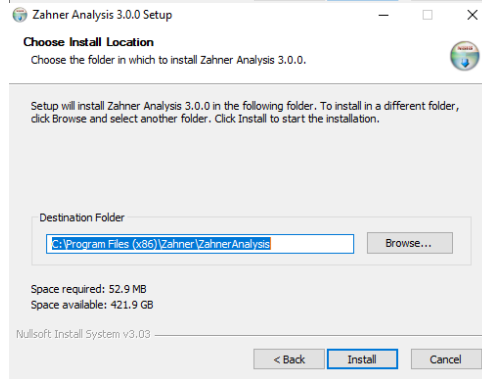
Click **Install**.

Zahner Analysis installation is complete.
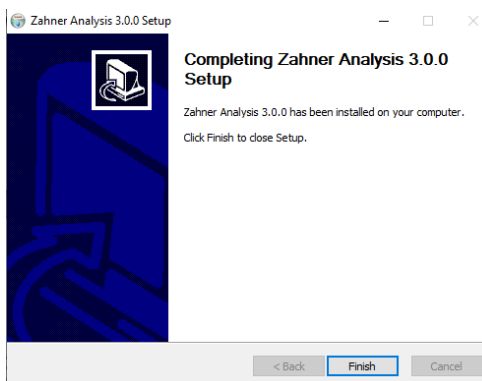
Choosing Thales XT GUI interface
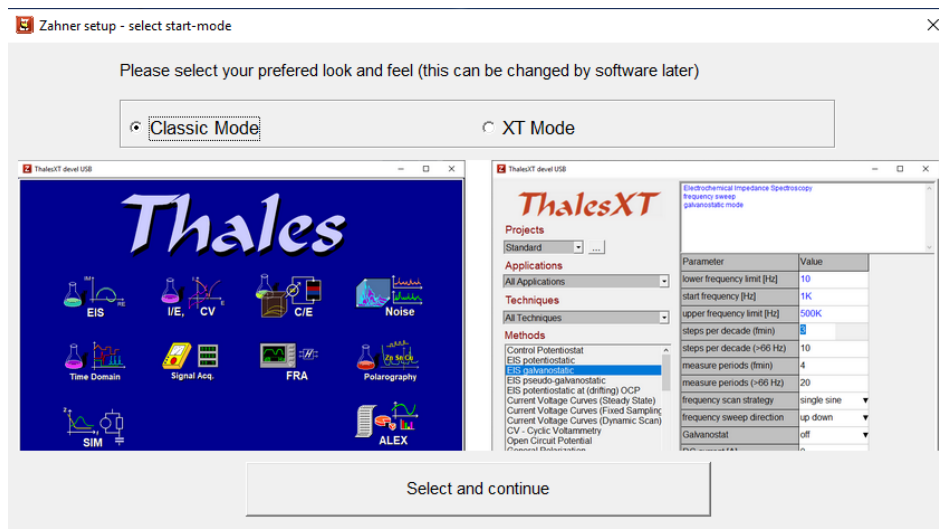
After the installation, you decide upon Thales Classic mode or Thales XT mode.

Thales Classic mode: This mode is a complete mode where each parameter can be fully controlled and a dedicated experiment can be performed.

Thales XT mode: This mode allows easy access to perform different experiments. We suggest, Thales XT for the users who are not experts in the field of electrochemical experiments.

Shifting from classic mode to Thales XT or vice versa is always possible even after installation.

<div align="center">

The Installation is complete now!

</div>

The Thales XT installation creates the following folders on your hard drive:

> c:\flink
> c:\thales
> The USB device drivers are installed to c:\Windows.

The installation software creates the folder **Zahner** in your Windows Start Menu containing the following links and folders:
- Thales USB
- Zahner Analysis
- BC-Mux controller

If selected, the installation software creates the following icons on your desktop:

 ThalesXT Software Suite – Main Software

 Zahner Analysis Tool

 BC-Mux Tool for high power DC system

4.2 Installation of the Calibration Data

The calibration data are individual for each device. Click on the **setup.exe** file from the Zahner USB to install the Calibration data. For the installation of the Calibration data, administrative access to the PC is required. The USB contains the calibration data for the complete system including *Zennium-ECW* and all optional devices like external potentiostats, light sources (CIMPS), HiZ probe, etc. you ordered with the workstation.

Click on the **Calibration Data Only**.

Click **Perform**.
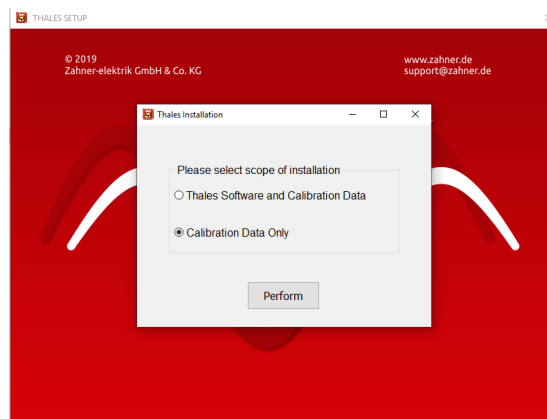
Choose the preferred language.
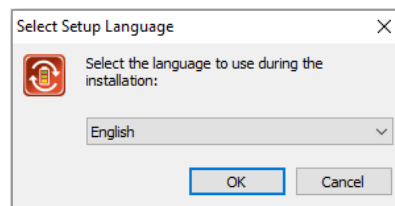
! **The installation of the Calibration data from USB is required to achieve the accuracy specified for the workstation and its options. If you miss installing the calibration data you will lose accuracy and get artifacts!**

Start installation.
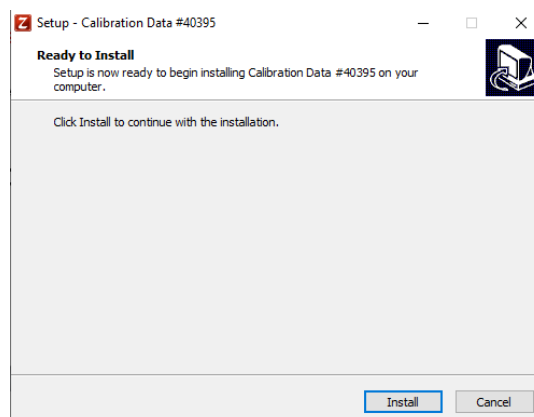
The installation is complete now!

5. Configuring & Starting the ThalesXT Software

To start the ThalesXT application, make sure that the ECW is turn on and connected to the PC via USB connection. Now, click/double-click on the icon.

The ThalesXT window will show the start-up screen:

After loading all data the screen will change to the ThalesXT main menu:
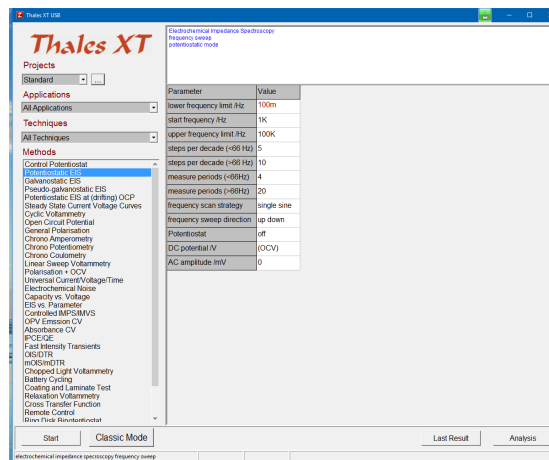
5.1 ThalesXT Main Menu

In the ThalesXT main menu, you can

1. Create, delete and edit Thales-Projects
2. Select your application field
3. Select your preferred techniques
4. Select the method you want to work with
5. Set the parameters for the selected method
6. Start a measurement with the selected method
7. Switch to Classic Mode
8. View last result
9. Switch to analysis software
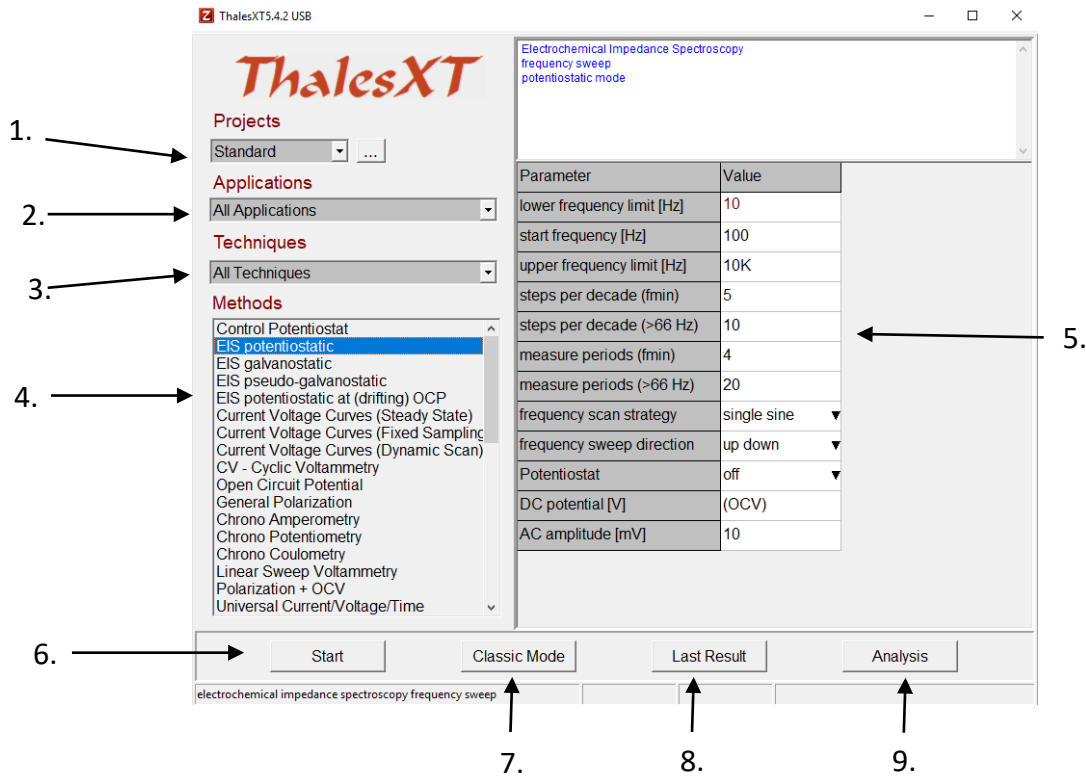
Projects

In Thales-Projects you can handle your favorite methods and settings. You are free to dedicate a Thales-Project to a person, to an application, to system-setup, a date, or to anything else. In a Thales-Project, a method with all its settings is saved.

Applications & Techniques

For selecting a method, ThalesXT provides two filters.

"Applications" filters all methods which normally are used in a certain application. If you e.g. set the "Applications" filter to "Batteries", under "Methods" only methods are listed which are relevant for battery research.

"Techniques" allow you to select a category of methods such as AC-techniques, static DC-techniques, and dynamic DC-techniques.

The filer makes the selection of a method easier and clearer.

Methods

From this menu, you select the method of your choice. If you set the "Application" filter to "All Applications" and the "Techniques" filter to "All Techniques", all available methods will be shown in this list.

Parameter List

Left to the selection area the parameters of the selected method are listed for editing. The inputs can be done either by entering a numerical value of your choice or by selecting one item from a pull-down list. When entering numerical values, all standard formats are allowed. If you e.g. want to enter a value of 0.01 you can alternatively enter 10m or 1e-2. When ENTER is pressed or you set the cursor to another parameter the entered parameter is checked for consistency with the hardware and with related parameters. If the check is passed the value is displayed in blue color. If an erroneous value is entered, the closest valid value will set instead.

Start

Clicking on this button "**Start**", a measurement of the selected method using the previously defined parameters. The dedicated Acquisition Windows will open where you can control and watch the measurement progress. The example shows the EIS online windows.
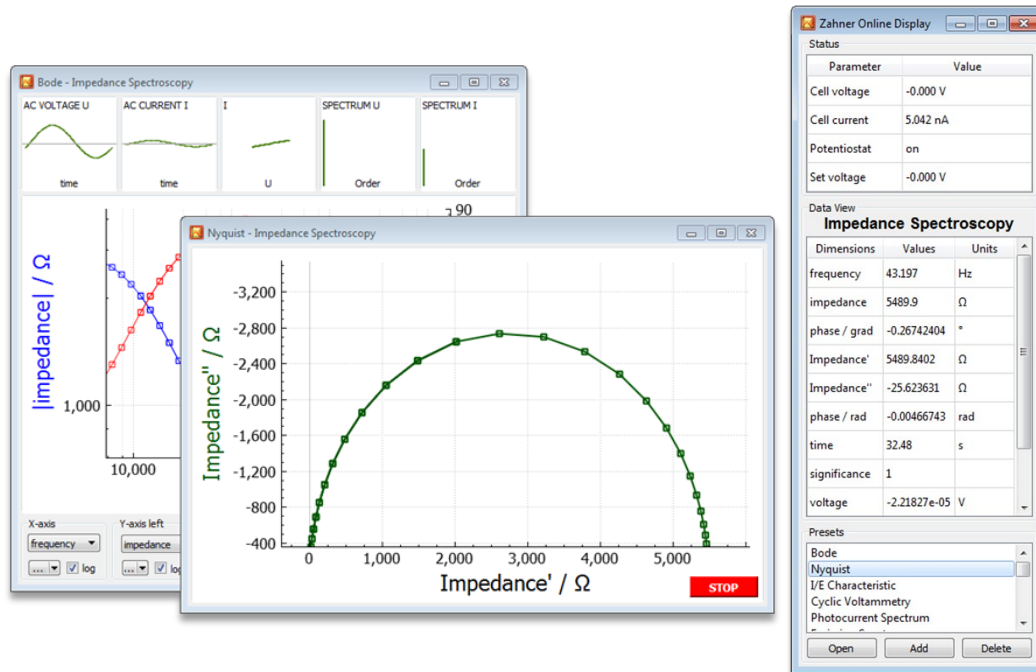
Classic Mode

Not all methods and parameters can be accessed by the ThalesXT user-interface. Furthermore, there may be users who got acquainted with the classical Thales user-interface. Therefore, we still provide this "blue" version of Thales on request. You access the Classic Mode by clicking on this button.

Last result

You will get into situations where you want to have a look at the previous results. This can be done by clicking on this button.

Analysis

This button switches to the Analysis Section of the Thales software.

6. Classic Mode
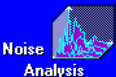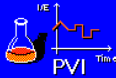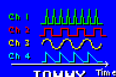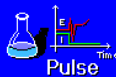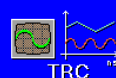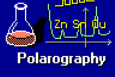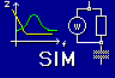
You can change into Classic Mode by clicking on the Classic Mode button in the ThalesXT main menu. This gives access to more methods and in some cases more details. If you selected a method before entering Classic Mode, ThalesXT will directly jump to the corresponding Classic Mode page. If you would like to work in Classic Mode every time you start ThalesXT, open the file c:\flink\usb.ini and change the parameter "simple =0". "simple = 1" selects the ThalesXT mode.
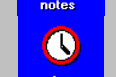
In Classic Mode you will get the following main menu:

This menu is leading you to the main pages of the methods implemented. By pointing (not clicking) on the icons some of them are showing up a sub-menu with additional icons. Clicking on an icon will bring you to the appropriate software section. The following program sections are available:

Main icon	Sub-menu icon	Program section
EIS / I/E, CV		- - Test sampling, Check Cell Connections - Impedance Spectroscopy (EIS) Measurements - Series EIS Measurements
	I/E	Current/Voltage Curves
	CV	Cyclic Voltammetry
	Pol	Polarization
	Multi Cell I/E	Multi-Cell Current/Voltage Curves
C/E	C/E Measurement	Capacity/Voltage Measurements
	C/E Analysis	Capacity/Voltage Analysis
Noise	Noise Measurement	Measurement of Electrochemical Noise (only with N-PROBE)

	Description
Noise Analysis	Analysis of Electrochemical Noise
PVI	Time Domain Measurements
TOMMY	Not Available
Pulse	High-Current-Interrupt-Measurements (only with HCI option)
TRC	Fast Time Domain Measurements (only with TR8M or HCI option)
Signal Acquisition Setup	Setup of Additional Measurement Channels (only with optional TEMP/U, DIO, DA4, etc.)
Signal Acquisition	Online-Display of Additional Measurement Channels
FRA	Frequency Response Analysis
Polarography	Polarography Methods
SIM	Simulation & Fitting Software
ALEX	Import of Data Measured by Third-Party Hardware
Script	Script Sequencer
EXE	Execution of Special Software
UTIL	
text editor	Zahner Text Editor
file manager	File Manager
calculator	Online-Calculator
notes	Notepad
time date	Setting Time and Date
setup	General System Setup
CAD	Graphics Software

6.1 Menu Structure in Classic Mode

Also, the Classic Mode of the *ThalesXT* software (here called *Thales*) provides an easy-to-handle user-interface. Step by step it guides the user through all necessary settings. If you are familiar with your application, you can use the *Thales* software without special training. Due to the variety and complexity of the field of electrochemical measurements and analysis as well as due to the powerful and very helpful functions of *Thales*, we strongly recommend reading this manual carefully, anyway.
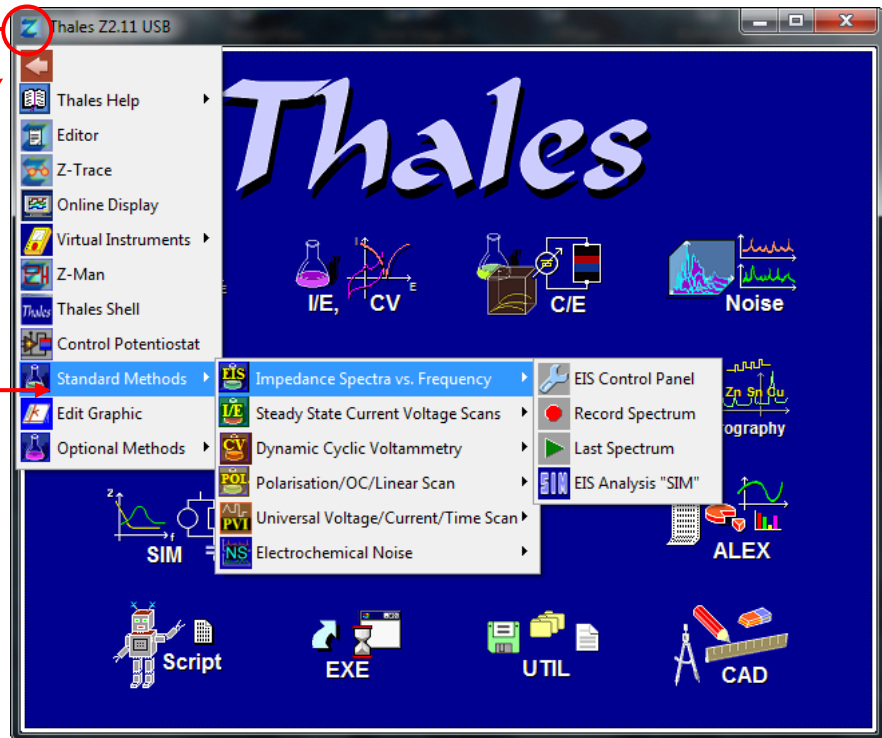
6.2 Pull-Down Menu

The Thales pull-down menu lets you access your applications faster and clearer.

Click on the Thales icon in the title bar to open the pull-down menu.

The first entry is a variable button for the last called pull-down function and is also available when using the middle mouse button after escaping from a software page.

You can easily navigate through the most commonly used applications and access them directly with one click.
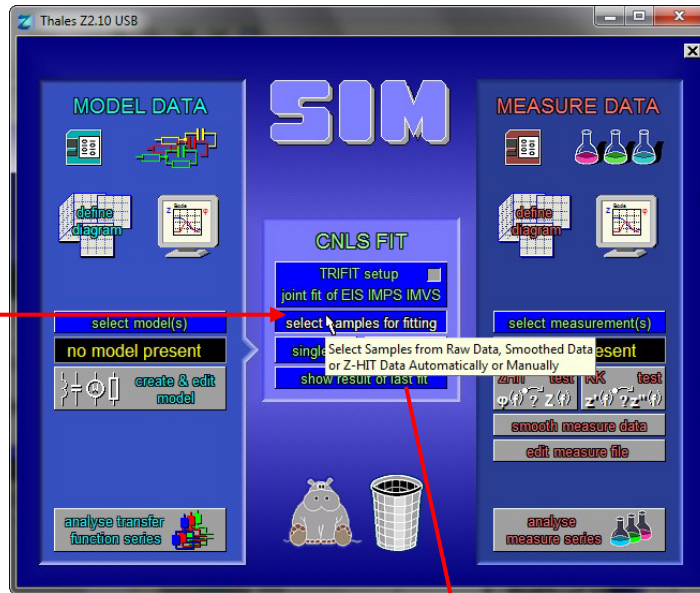

During a measurement, you can only start external software modules. The pull-down menu shows only the available options.
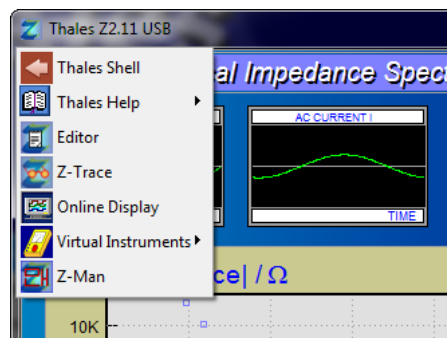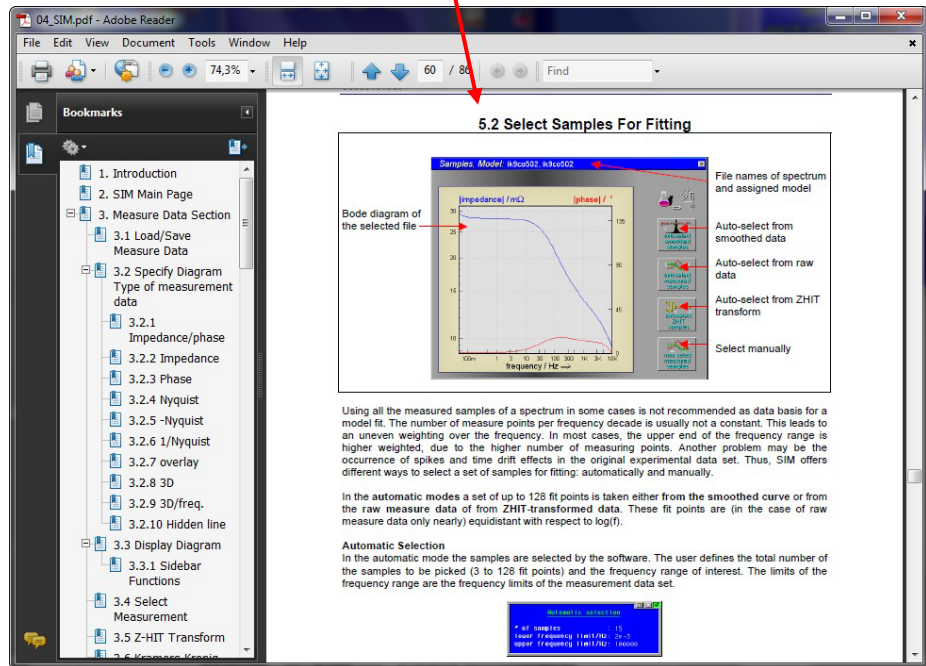
6.3 Tooltips & Online Help System

When pointing the mouse cursor to an active button, a small *Windows*® *tooltip* information will pop-up after a short delay.
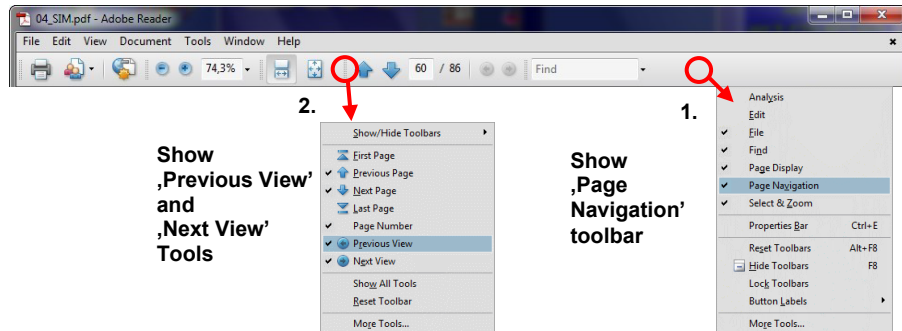

Full information about a function or button can be accessed by clicking the secondary mouse button.

The standard *Adobe Reader*® opens the PDF manual according to the software function.

Recommended *Adobe Reader*® configuration for best navigation through the Thales Software manuals.

6.4 Scalable Thales Window

The Thales window is proportional scalable from 80% to maximum screen resolution in steps of 80 pixels (width). Zoom in with `CTRL` + `+` and zoom out with `CTRL` + `-` or use minimize and maximize window buttons.

Maximize Thales window (depends on screen resolution)

Minimize Thales window (100%)
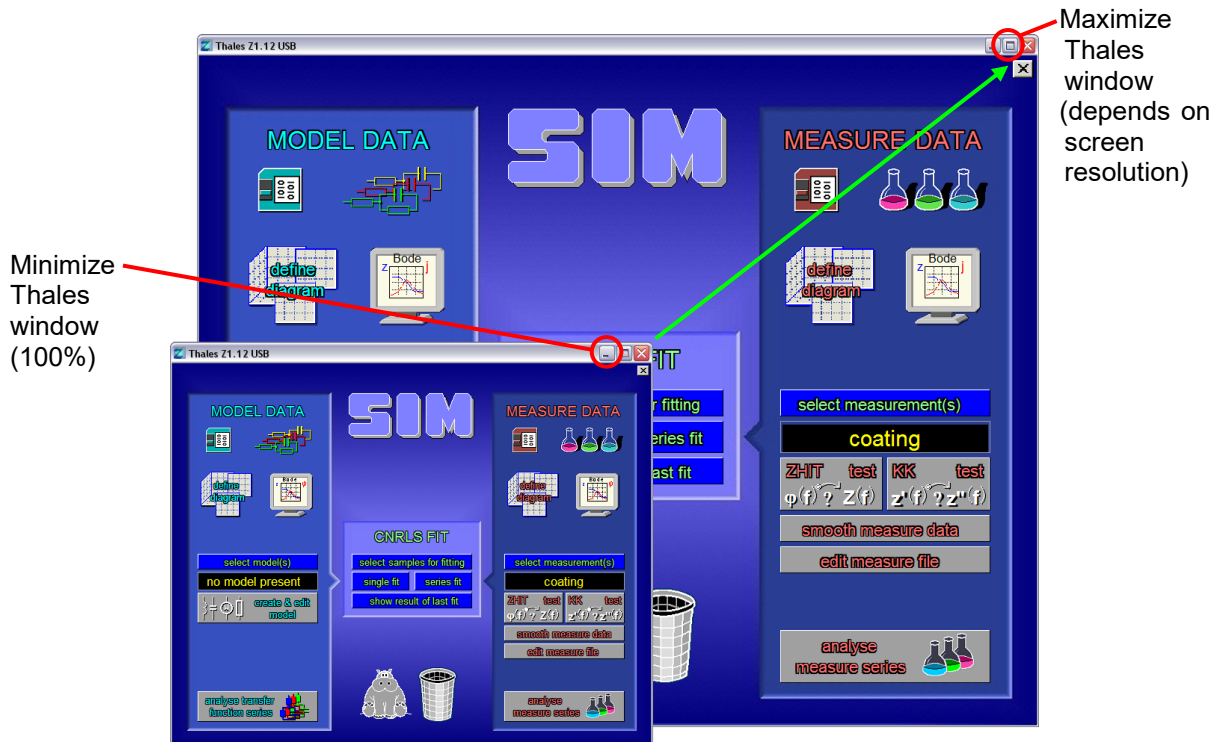
6.5 Mouse

The *Thales* software mainly is handled using the mouse as you know it from Windows. When you are pointing with the mouse cursor on a "button", it will change its color and/or its shape so that you easily can identify buttons by leading the mouse cursor through the Thales window. To activate the function of a button, **left-click** on it.

With the **middle mouse button** you have one of three similar functions depending on the context:
- you reach the next higher menu level
- you terminate a running process
- you escape from a dialog without accepting the changes made.

It is equal to a click on the close button of a window ☒ or pressing the `ESC` key.

The **right mouse button** is used in some pages to call a help window (e.g. in SIM). In other contexts (e.g. directories, selecting curves), it is used to select/unselect (toggle) an entry. If you input numerical values, a right-click will replace the input number by a default value or clear the input default.

The mouse cursor in many situations is guided. That means it is placed automatically to the position it is needed most likely. This function helps to save a lot of mouse movements and time.

6.6 Special Keys

Some keys have special functions when handling the user interface of the Thales software:

ESC	With the **ESC** key you have one of three similar functions depending on the context: - you reach the next higher menu level - you terminate a running process - you escape from a dialog without accepting the changes made.
Space	The space key can be used to select or deselect (toggle) items such as directory entries, curves etc. In this context, it has the same functions as the right mouse button.

6.7 Input Boxes

All inputs are done in grey input boxes. This guarantees that all inputs can be done in the same way and by using the same tools.
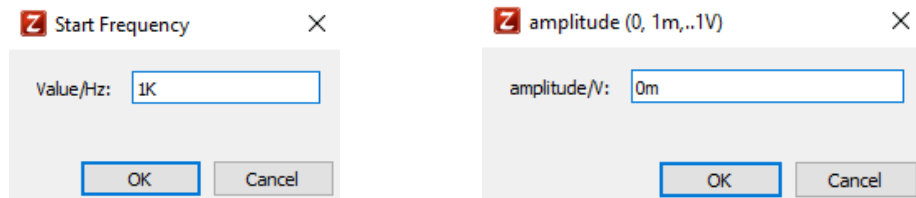
In the *Thales* environment, all input-boxes accept not only pure values but also the following technical **multiplier prefixes (engineer's units)**:

prefix	meaning	multiplier
a	atto	10^{-18}
f	femto	10^{-15}
p	pico	10^{-12}
n	nano	10^{-9}
u	micro	1/1000000
m	milli	1/1000
k, K	Kilo	1.000
M	Mega	1.000.000
G	Giga	10^{9}
T	Tera	10^{12}
P	Peta	10^{15}
E	Exa	10^{18}

You don't need to provide the unit (V, Hz, A, etc.). This is done by the software automatically (exception: amplitude in pseudo-galvanostatic (V) and galvanostatic (A) mode).

Examples:							
0.1	=	100m	=	1e-1			
1000	=	1k	=	1K	= 1e3		
1000u	=	1m	=	0.001	= 1e-3		

In some experimental setups (like CIMPS), some inputs are only possible in blue input boxes. An input box has got three symbols at the upper right corner, which are shown only when the mouse cursor comes close to the upper right corner of the input box.
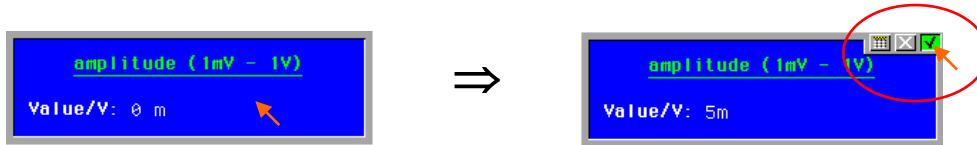
If you click on one of these symbols the following actions will be carried out:

    Closes the box **accepting** the input
    Closes the box **rejecting** the input
    Calls the *Thales Calculator*

An input box may have one or more lines for one or more parameters or texts to be input. You finish a line by pressing the ⎡ENTER⎤ key. If the box only had one line or you edited the last line, the box will close then and the new value is accepted. If the box has more than one line and you did not edit the last line, you will come to the next line. No matter in which line you are, clicking on the close buttons will close the box accepting the new value(s) ☑ or rejecting it ☒.

In more-line-boxes you can also position the text cursor to a specific line by clicking with the mouse onto the line. If you do want to reject the new value, click the middle mouse button, press the ⎡ESC⎤ key, or click on the close button ☒ of the input box.

6.8 Hardcopy

Every page displaying curves provides a *hardcopy* button. Clicking on it will produce either a print-out of the recent page or a copy of the graphic in the Windows clipboard. The printout is done on the "Windows Standard Printer" installed under Windows. Most of the Windows-compatible printers will also work with Thales. There may be printer models that do not work properly with Thales although they work under Windows. Those problems do not lie in our responsibility. Please use a different printer model in that case. Please try a printer also with Thales before you buy it.