BECKHOFF New Automation Technology

Manual | EN

BST

Beckhoff Service Tool

2024-02-09 | Version: 1.4

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1 Notes on the documentation

This description is intended exclusively for trained specialists in control and automation technology who are familiar with the applicable national standards.
For installation and commissioning of the components, it is absolutely necessary to observe the documentation and the following notes and explanations.
The qualified personnel is obliged to always use the currently valid documentation.

The responsible staff must ensure that the application or use of the products described satisfies all requirements for safety, including all the relevant laws, regulations, guidelines, and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without notice.
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1.1 Explanation of symbols

The following symbols with corresponding warnings or explanatory text are used in the documentation. Read and follow the warnings.

Symbols that warn of personal injury:

⚠ DANGER
Serious risk of injury
Note this warning. Hazard with high risk of death or serious injury.

⚠ WARNING

Risk of injury

Note this warning. Hazard with medium risk of death or serious injury.

⚠ CAUTION

Personal injuries

Note this warning. Hazard with a low degree of risk, which could lead to minor or moderate injury.

Symbols that warn of damage to property or equipment:

NOTICE

Damage to the devices or environment

Note this warning. Risk of damage to the environment and equipment.

Symbols indicating further information or tips:

Tip or pointer

This symbol indicates information that contributes to better understanding.

1.2 Documentation issue status

Version	Modifications
1.0	First version.
1.1	Revision of all chapters and adaptation to the latest BST version.
1.2	"Overview" chapter revised and "Error handling and diagnostics" added.
1.3	Revision of all chapters with a focus on the latest BST version.
1.4	"Creating image hashes" chapter added.

2 Overview

The Beckhoff Service Tool, BST for short, is an easy-to-use graphical backup and restore program for industrial PCs with a Windows operating system.

With the Beckhoff Service Tool (BST) you can create an image of your operating system at any time. This creates a backup copy of the contents of your PC's data carrier. You can then restore the created images and thus the Windows installation on a previously empty data carrier.

The BST is supplied on a USB stick. The BST sticks are available in sizes of 4, 8, 16, 32 or 64 GB. Select the size of the BST USB flash drive according to the size of the backup copy of your operating system. The BST starts as soon as you boot the industrial PC from the BST stick. You can save the images on the industrial PC, on a network drive or directly on the BST stick. You can keep the flash drive as a backup copy. For this purpose, the BST USB flash drives are designed for particularly long data preservation by means of special flash.

BST versions and supported industrial PCs

BST version 2.1.x.xx is the current version of the Beckhoff Service Tool and is suitable for all newer industrial PCs. To use this BST version, the industrial PC must meet the following criteria:

- at least 2 GB RAM
- Legacy/UEFI (x64) BIOS mode

The old BST version 2.0.x.xx is still available for older industrial PCs that do not meet the above criteria.

The following table compares the two BST versions:

Table 1: BST versions

	BST version 2.1.x.xx	BST version 2.0.x.xx
DRAM (min.)	2 GB	256 MB
Acronis version	Acronis Backup 11.x	Acronis True Image 9.1
WIM format	possible	not possible
Boot mode	Legacy/UEFI	Legacy
Touch screen	Single touch / multi touch	not possible
Remote access with TightVNC	possible	not possible
TwinCAT license transfer in case of image change	possible	not possible

Updating the BST stick with the ApplyBST tool

You can use the ApplyBST tool to update a BST stick. You can download the BST versions from the Beckhoff website. ApplyBST tool [▶ 10]

Remote access with TightVNC

Remote access to the BST is possible with TightVNC. The prerequisite for this is BST version 2.1.x.xx. Use remote access if no input and output devices are available for configuring the BST on an industrial PC. If you are not yet using TightVNC, ask your company's IT department for the software.

BST start page

The start page of the Beckhoff Service Tool (BST) appears as soon as the industrial PC has successfully booted from the BST stick.

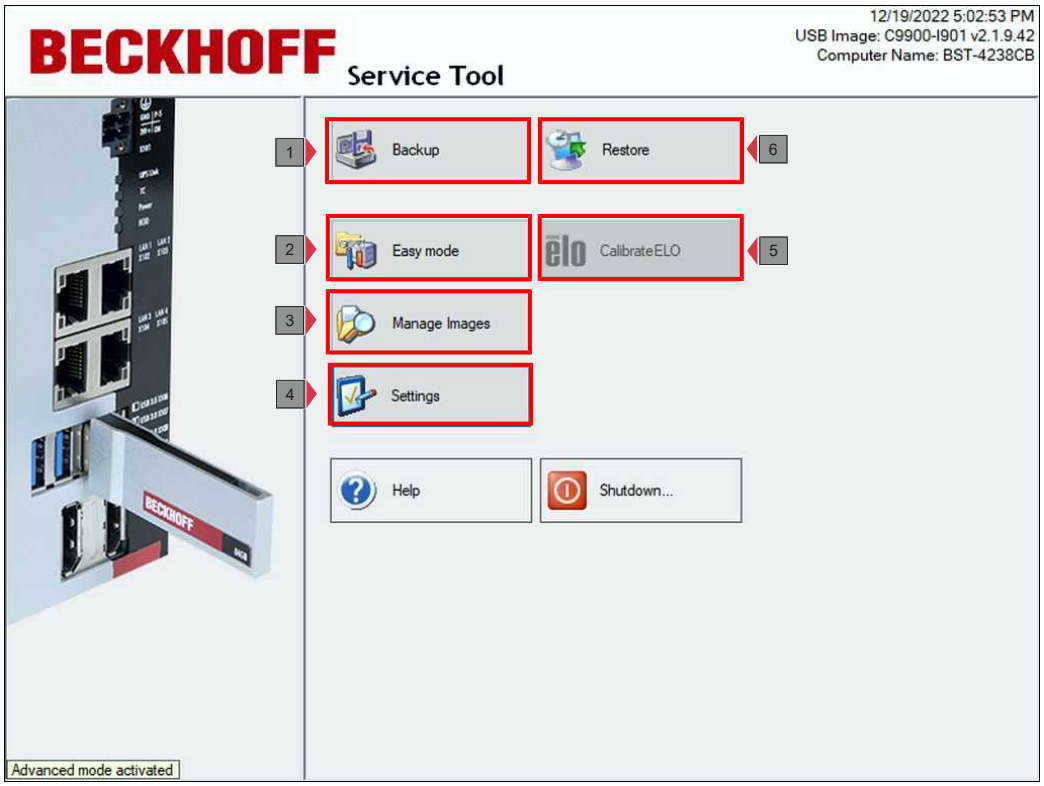


Fig. 1: Graphical user interface of the Beckhoff Service Tool (BST) after startup.

Table 2: Legend for the start page setup.

No.	Button	Description
1	Backup [▶ 14]	Creates an image of storage media or individual partitions in TIB or WIM format.
2	Easy mode [▶ 23]	Enables or disables Easy mode. With Easy mode enabled, the **Backup** or **Restore** button can be used to automatically create or restore an image with predefined default settings. The default settings for the Easy mode can be configured under **Settings**.
3	Manage Images [▶ 25]	Use this button to manage the images
4	Settings	Further settings, e.g. user-defined buttons, Easy mode, network drives and Fallback.
5	CalibrateELO	Starts the calibration program to calibrate resistive touch screens of the CP6xxx, CP7xxx and CP3xxx series directly from the BST. However, no calibration is required for multi-touch devices.
6	Restore [▶ 17]	This button can be used to restore previously created images or to install Beckhoff images.

3 ApplyBST tool

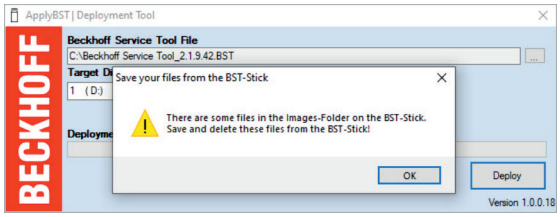
The ApplyBST tool allows you to install current BST versions on a BST stick. The ApplyBST tool is only compatible with Beckhoff BST sticks. USB sticks from other manufacturers are not compatible and are not available for selection.

The ApplyBST tool and a current BST version can be downloaded from the Beckhoff website.

Requirements:

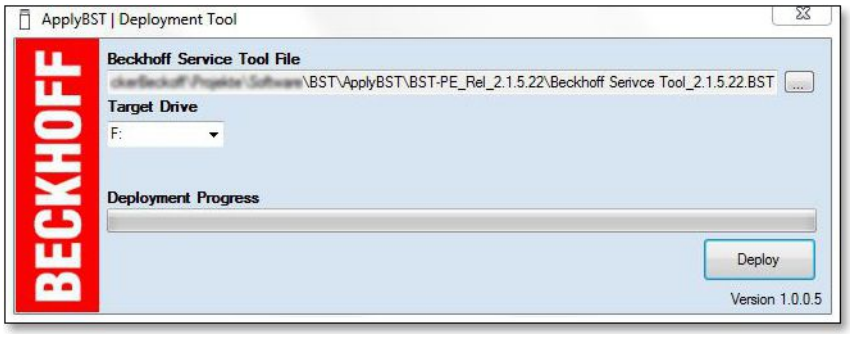
- Beckhoff BST stick without image.
- ApplyBST tool and a current BST image. Search for "BST" under Software and Tools in the download finder:
  https://www.beckhoff.com/downloadfinder

If there is already an image on the BST stick and you want to install a new BST version on the BST stick, an error message appears. This indicates that you must first back up data on the BST stick and delete it from the BST stick before you can install a new BST version.

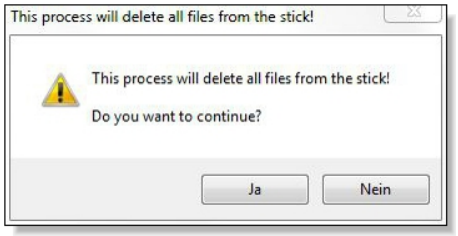


Install a new BST version as follows:

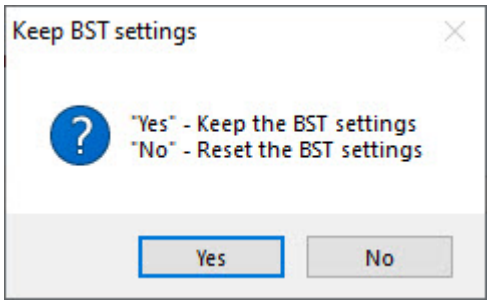
1. Start the ApplyBST tool with **ApplyBST.exe**.



2. Select the current BST version under **Beckhoff Service Tool File**.
3. Select the BST stick under **Target Drive**.
4. Click **Deploy** to install the new BST version.



5. If there is already a BST version on the USB stick, a query is made as to whether the existing settings should be adopted or overwritten.



⇨ The new BST version is installed. In the next step you can boot from the BST stick and create or restore images.

4 Remote access with TightVNC

With TightVNC Viewer you can access the BST remotely in BST version 2.1.x.xx. Use remote access if no input and output devices are available for configuring the BST on an industrial PC. In the delivery state, the TightVNC server is deactivated and must be activated by the BST in the settings.

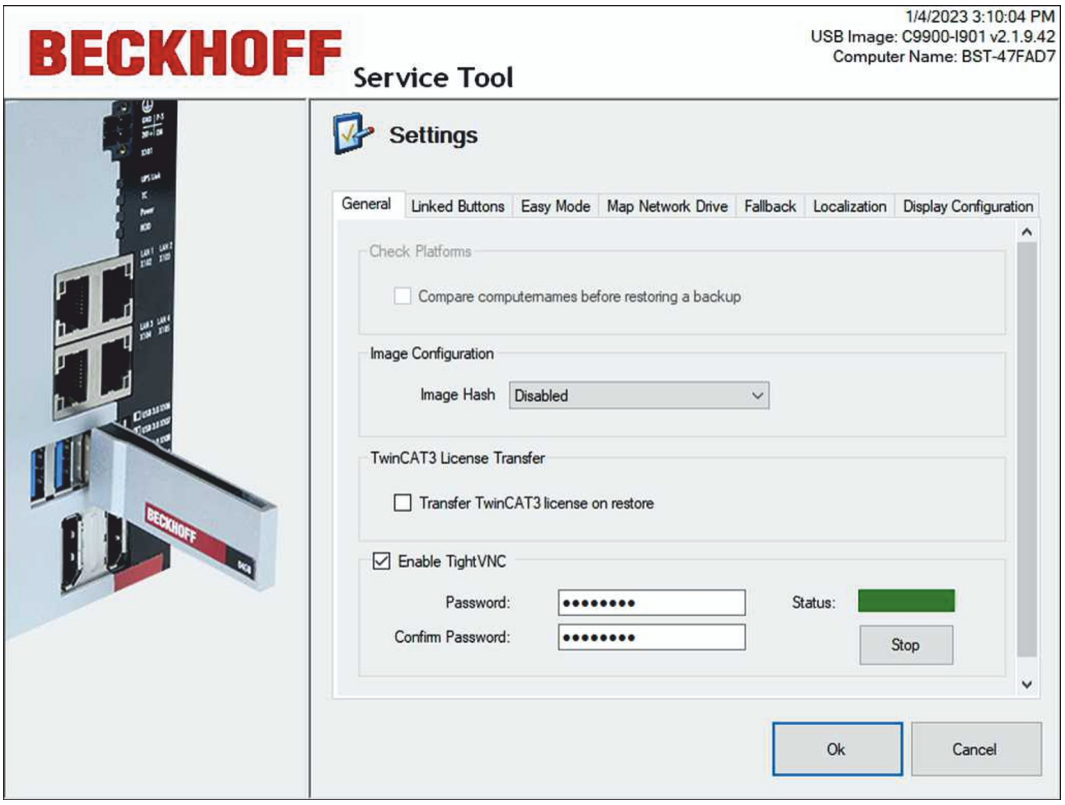
To this end, install TightVNC on a configuration computer and make sure that the configuration computer and the industrial PC are in the same network. The BST receives the IP addresses from a DHCP server.

Requirements:

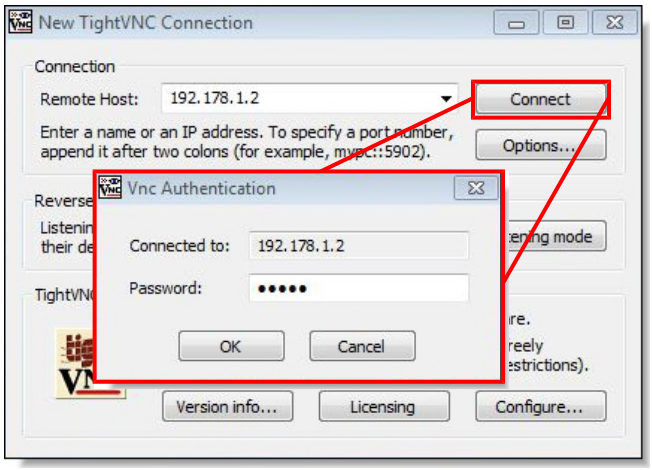
- TightVNC Download

Configure remote access as follows:

1. Click the **Settings** button and select the **General** tab.

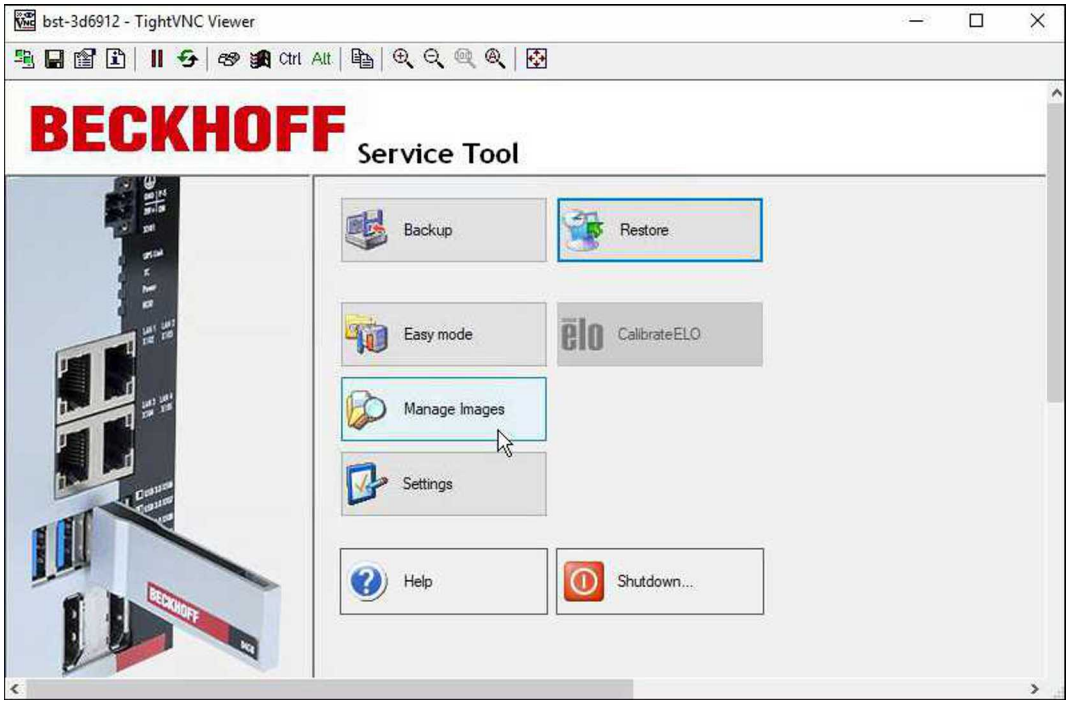


2. Select the **Enable TightVNC** option to enable the TightVNC server. And assign a secure password consisting of one to eight ASCII characters.
3. Install TightVNC and start the **TightVNC Viewer**.
4. At **Remote Host**, enter the IP address of the BST or the host name and click **Connect**.



5. Enter the previously defined password to start remote access to the BST.

⇨ Remote access is started and the BST start page is displayed. In the next step, you can remotely configure the BST or create and restore images.



5 Create and restore backup

This chapter describes the steps and prerequisites to start the BST, as well as the steps to create and restore a backup. The chapter is organized as follows:

- Start BST: Describes how to boot the industrial PC from the BST stick. The important thing here is the boot sequence set in the BIOS and the use of the appropriate BST version for the industrial PC used.
- Create backup: Describes how to create an image of complete storage media or individual partitions in TIB or WIM format. The image can be saved on the BST stick or on a network drive.
- Restore Backup: Describes how to restore a backup.

5.1 Start the Beckhoff Service Tool (BST)

The industrial PC must be booted from the BST stick in order to start the BST. Observe the boot order in the BIOS.

If the BST doesn't start, this means that the boot order has been changed or you are not using the correct BST version for the industrial PC in use. Check the boot order in the BIOS and whether you are using the correct BST version.

Requirements:

- The BST stick must be connected directly to the industrial PC without a USB hub or a USB extension.
- The USB stick is the first boot medium in the BIOS.
- Correct BST version for the industrial PC in use.

Start the BST as follows:

1. Connect the BST stick to the industrial PC and start the industrial PC.
2. The BST is started and the start page is displayed.

   - if the BST does not start -

3. Restart the industrial PC and press **[Del]**.
   The BIOS setup is started.
4. Check under **Boot** > **FIXED BOOT ORDER Priorities** whether the option **Beckhoff Stick** is set under **Boot Option #1**.
5. Check under **Boot** > **Boot mode select** whether the correct boot mode is selected for your BST. In DUAL mode the correct boot mode is selected automatically, depending on the BST.
6. Save the settings and exit from the BIOS.

⇨ The BST is started with the correct boot order and the correct BST for Legacy or UEFI BIOS.

5.2 Creating a backup

You can create an image of complete storage media or individual partitions in TIB or WIM format. The WIM format is supported from BST version 2.1.9.42. For more information on the WIM format, please visit: https://learn.microsoft.com/en-us/previous-versions/msdn10/dd861280(v=msdn.10)

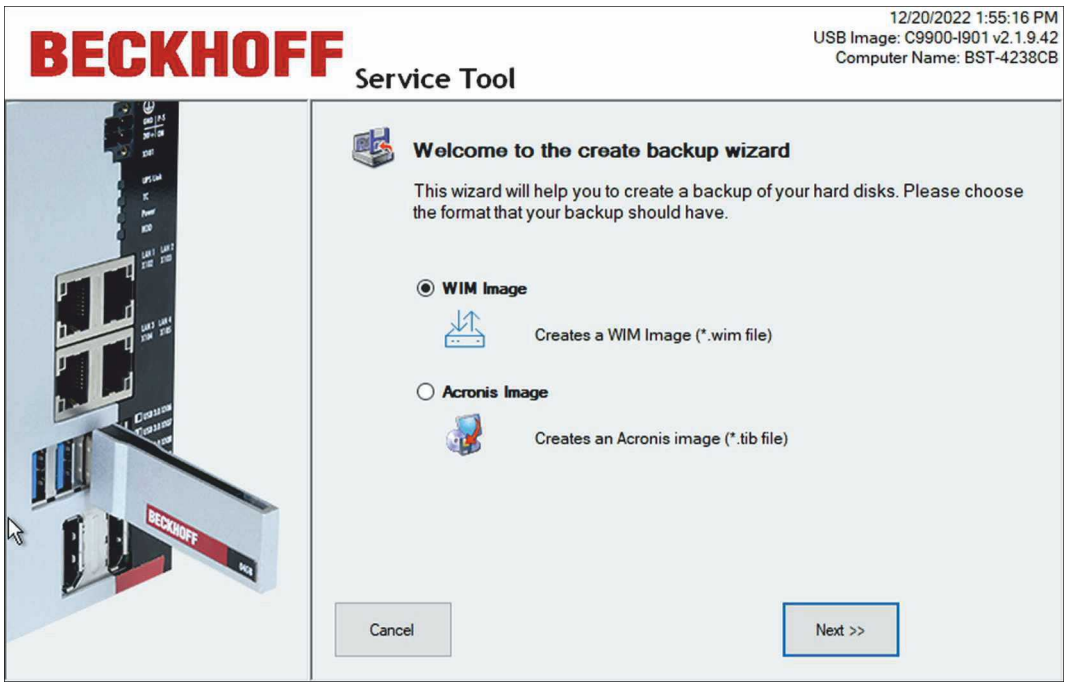
You can save the image on the BST stick, locally on the industrial PC or on a network drive. Depending on the backup format, certain options and settings are not displayed or grayed out.

Requirements:

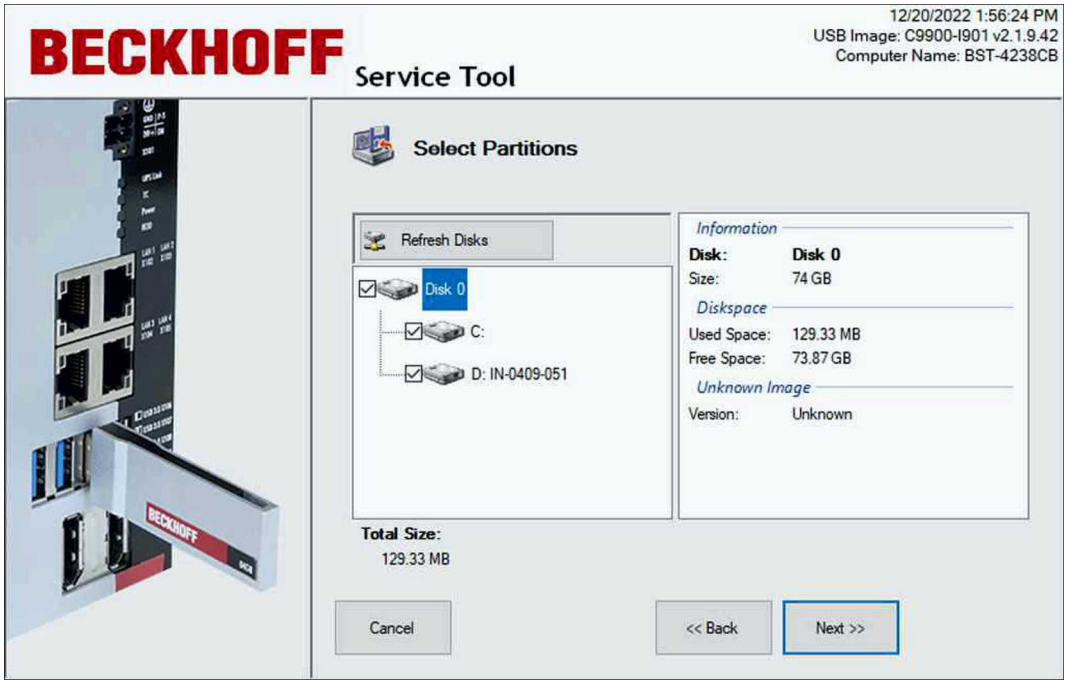
- Sufficient space on the BST stick or network drive.

Create an image as follows:

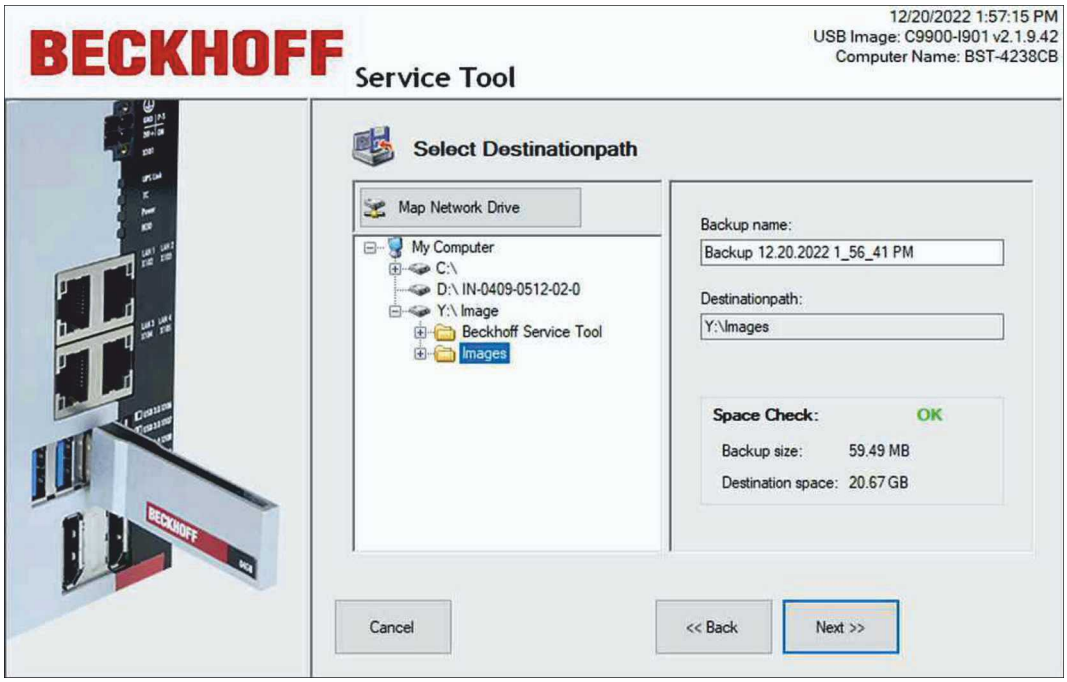
1. Click the **Backup** button and then select the backup format.



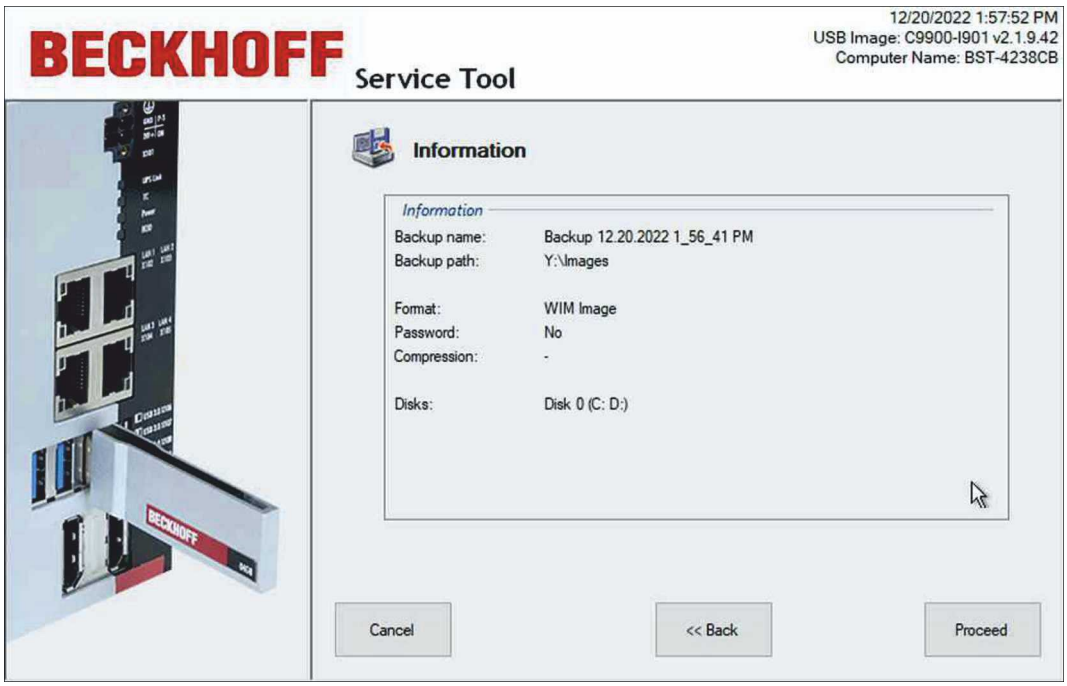
2. Select the drives and partitions you want to back up as an image.



3. In the tree view, select the destination directory where you want to save the image. Use the **Map Network Drive** button to integrate a network drive.



4. In the next step you can set a password and the compression level if you have selected the TIB format. With the WIM format it is not possible to assign a password.
5. Check the settings and click **Proceed**.



⇨ The image is created. Click **Close** to return to the start page.

5.3 Restoring a backup

NOTICE

Loss of data

This step deletes data on the target disk.
Back up your data before restoring an image.

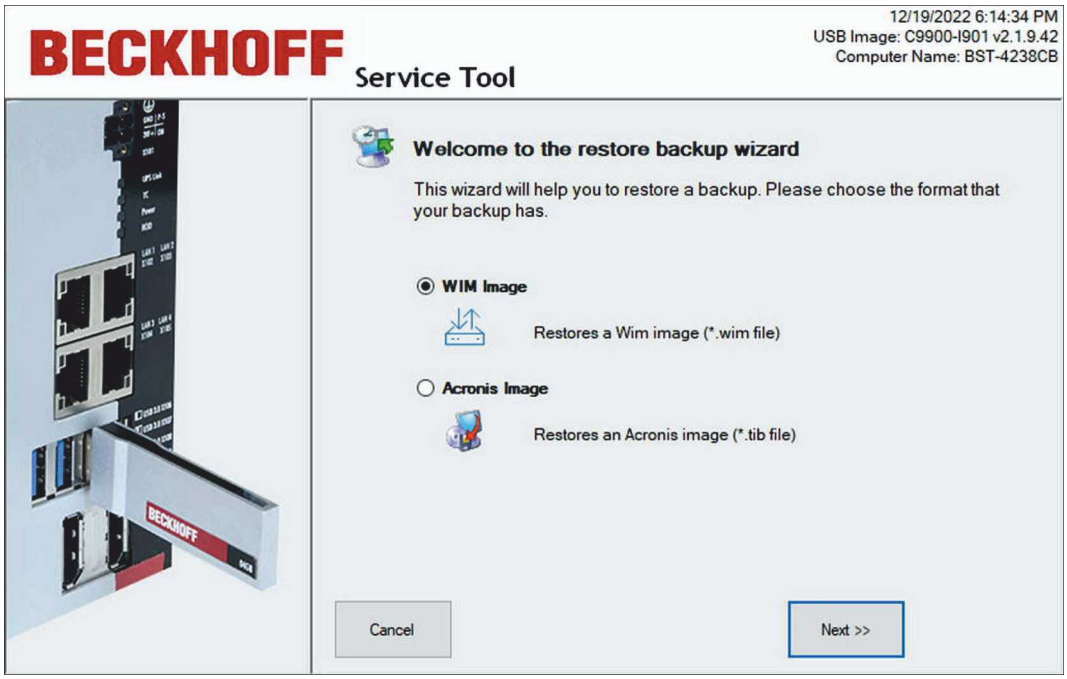
You can restore an image from a storage medium or a single partition. You can use this function in the event of an error or to create PC systems with identical configurations and settings.

Requirements:

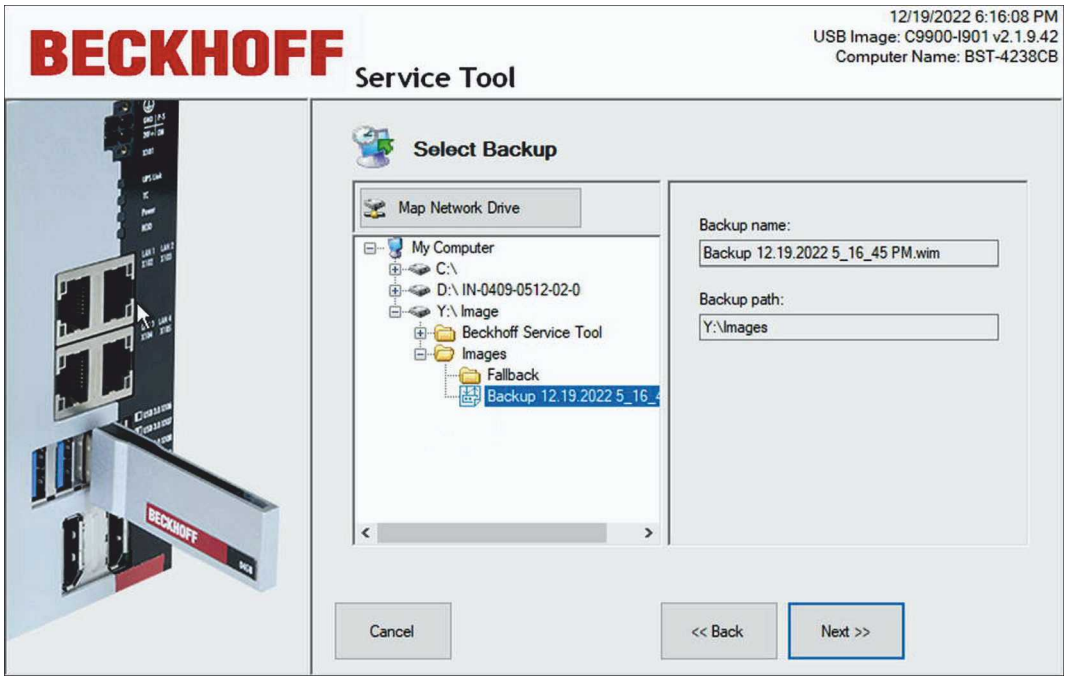
- A previously created image on the BST stick or a network drive.

Restore an image as follows:

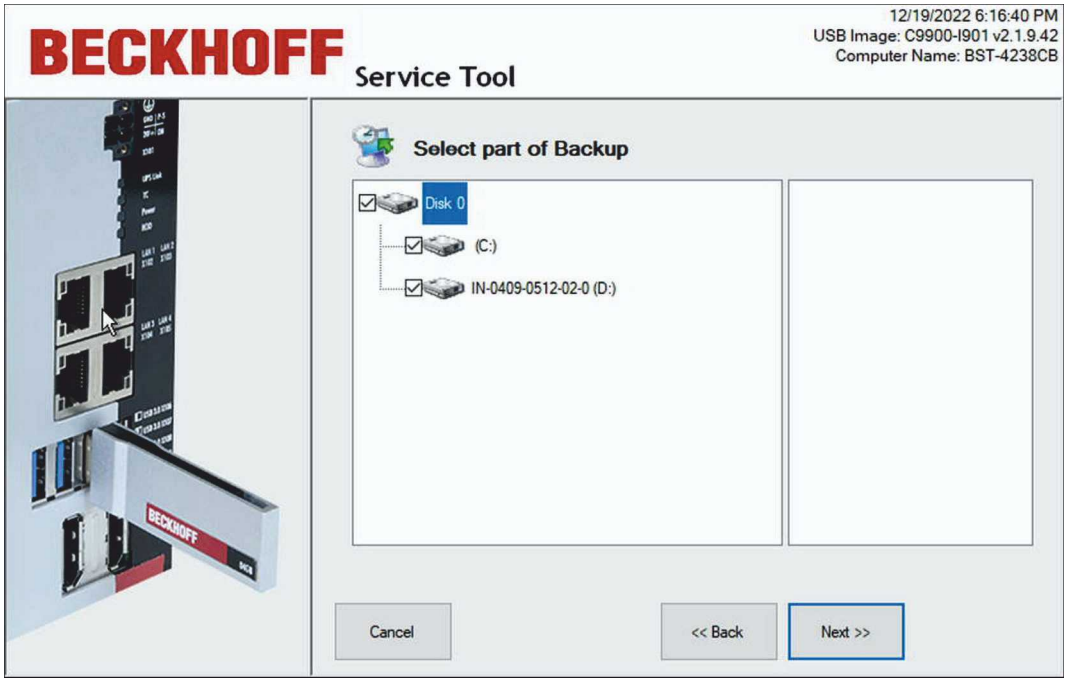
1. Click the **Restore** button and then select the backup format. The WIM format is only available for BST version 2.1.x.xx.



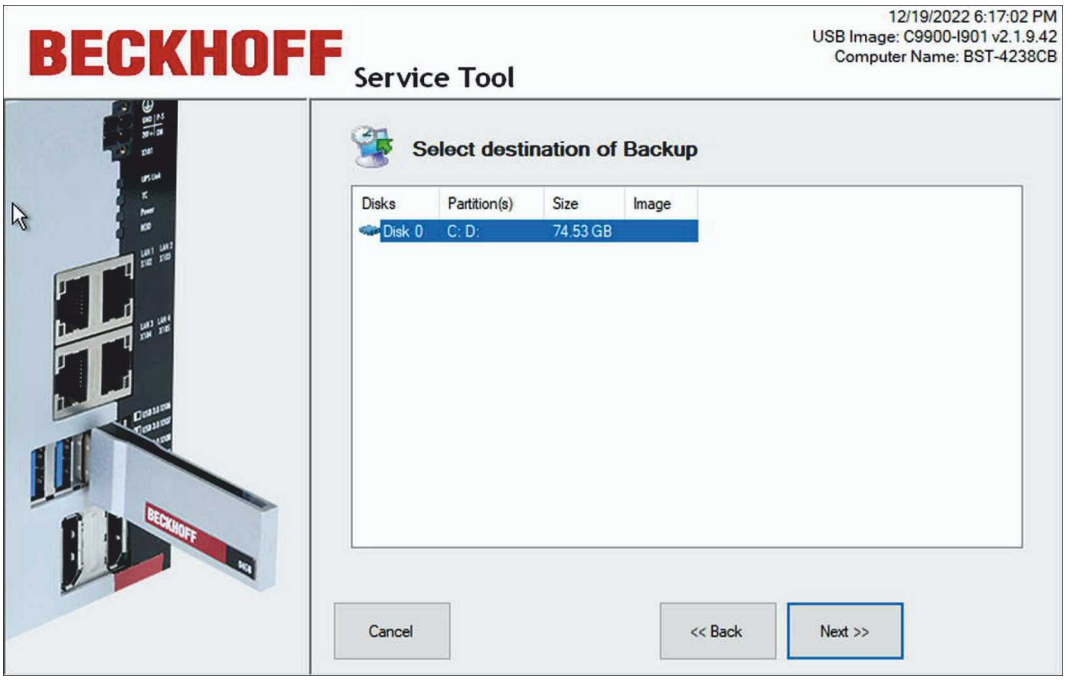
2. In the tree view, select the image you want to restore. Use the **Map Network Drive** button to integrate a network drive.



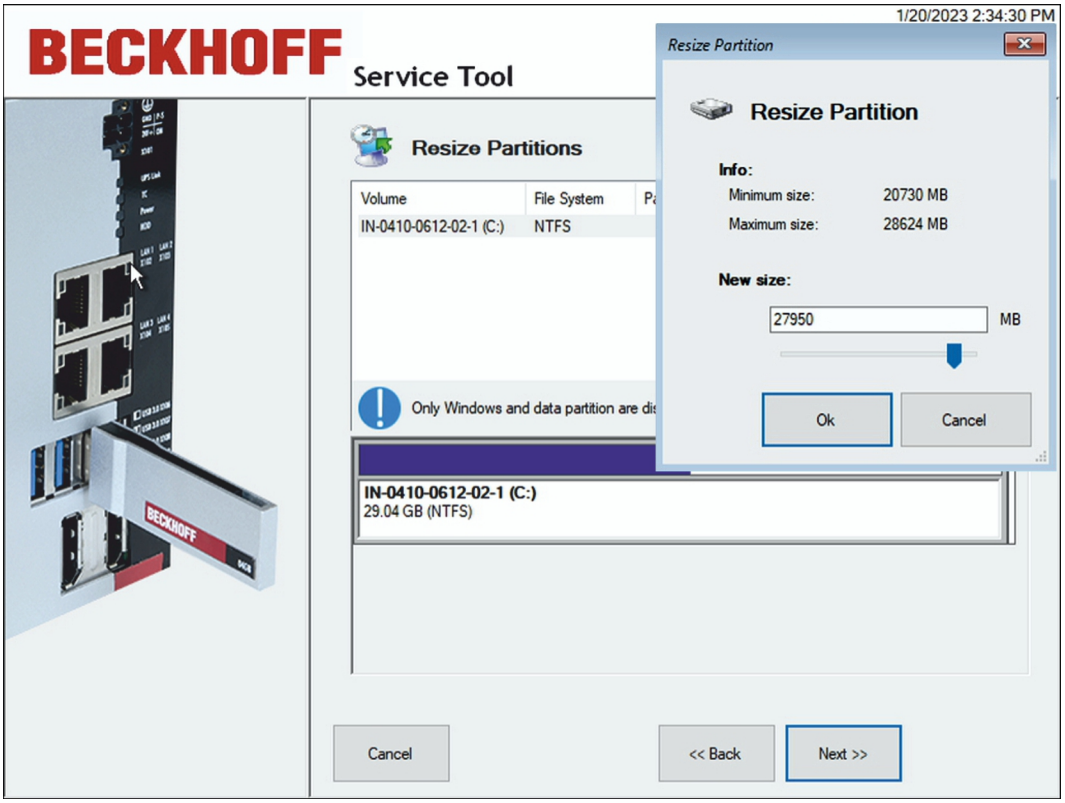
3. In the next step, the hard disks or SSDs and partitions available in the selected image are displayed. You can select individual partitions or complete storage media to restore.



4. Select the storage medium on the industrial PC on which the image is to be restored.

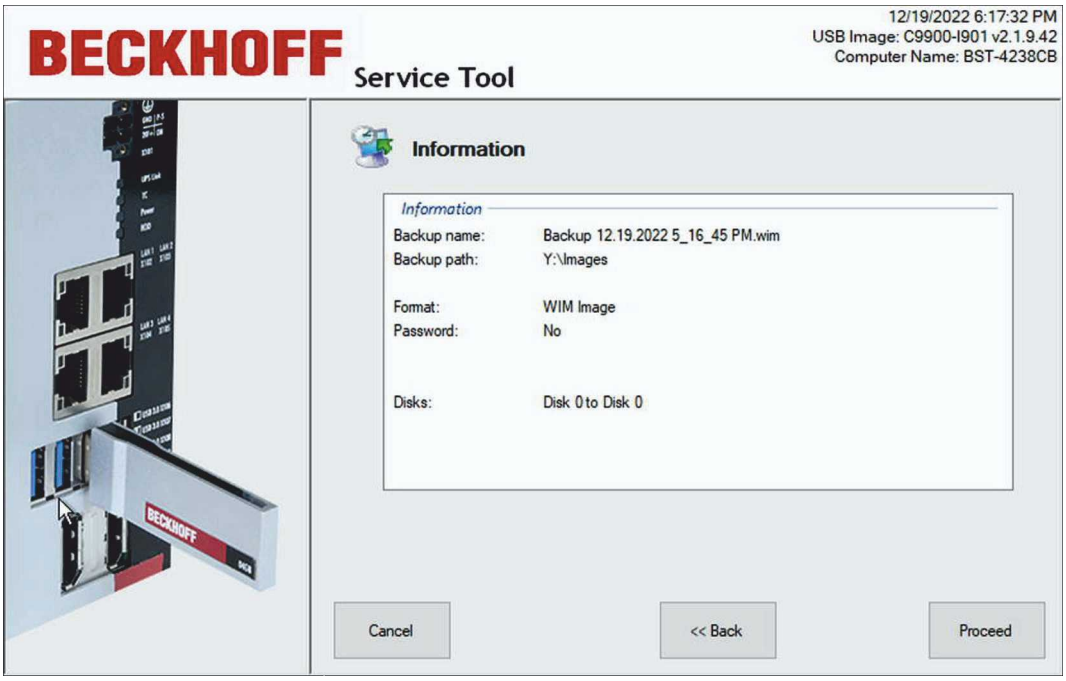


5. In case of WIM format, a disk management window also appears if the source and destination disks differ in memory size. In the Disk Management window, the user can adjust the partition size on the target disk if necessary. Only Windows and data partitions are displayed.



6. Right-click the partition you need to resize so that the **Resize Partition** window appears.

7. Check the settings and click **Proceed**.



⇨ Once the image has been restored, click **Close** to return to the start page. Click the **Shutdown** button, remove the BST stick and restart the industrial PC.

6 Configuration

The chapter describes different possibilities how to configure the Beckhoff Service Tool (BST). It is mainly about the use of the Easy mode, the simplified creation and restoration of images, as well as the possibility to manage the images stored on the BST stick or on the network.

6.1 Creating image hashes

You can create called image hashes to validate your images. If you execute the relevant configurations in the Beckhoff Service Tool, an image hash is created directly when an image is created. You can choose whether the image hash should be created as an MD5 hash or an SHA256 hash. When an image is restored, the image hash is then used for validation. The performance of the CPU and the data carrier dictates how long the hash calculation takes.

To create image hashes, execute the following configurations:

1. Click the **Settings** button and select the **General** tab.
2. In the **Image Hash** drop-down menu under **Image Configuration**, choose how the image hash should be provided.
3. Confirm your selection with **OK**.

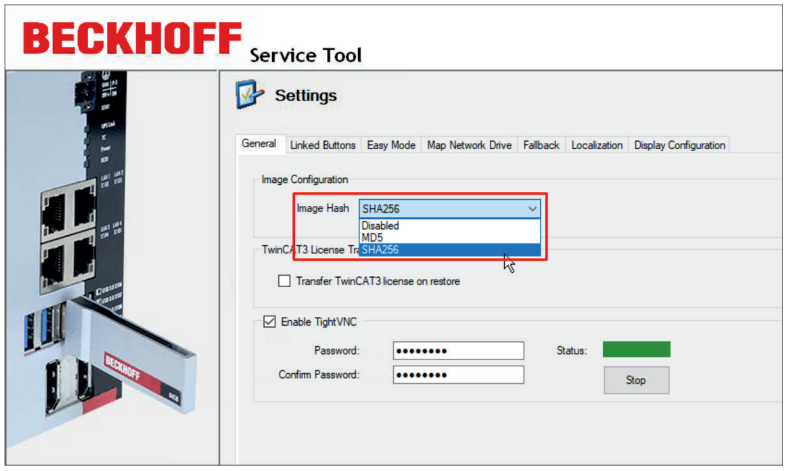


Fig. 2: Configuration of image hashes

If you have executed the configuration described above, a hash file with the additional extension **.MD5** or **.SHA256** is also created when an image is created.

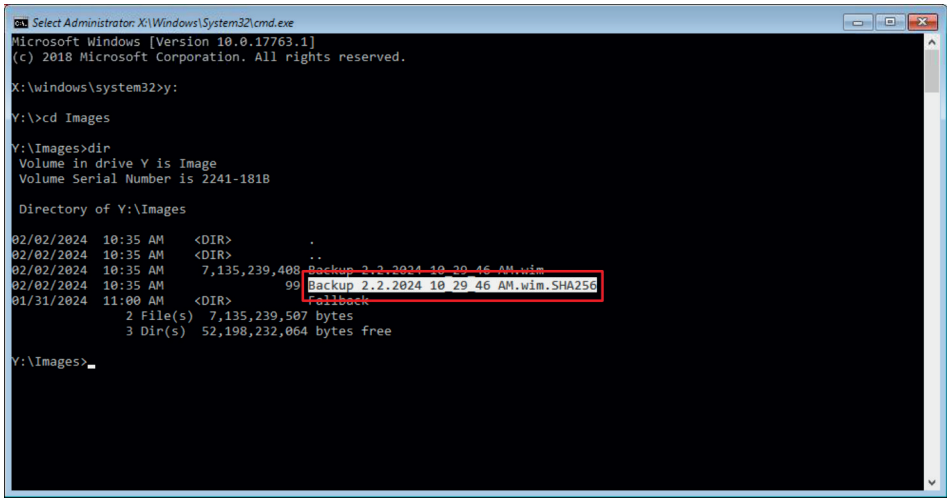


Fig. 3: Hash file

The complete hash file consists of the hash sum based on the algorithm used, an asterisk (*) and the relevant file name.

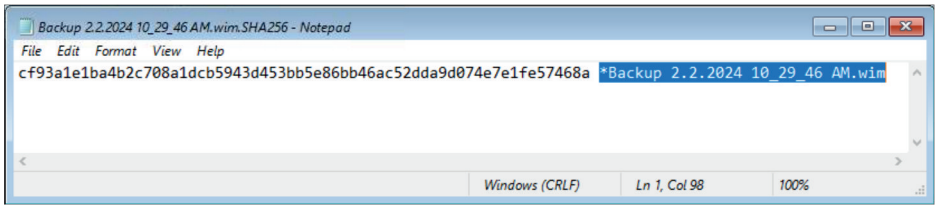


Fig. 4: Complete hash file

Using appropriate tools, such as PowerShell, you can compare the determined hash sum with the hash file. The hash sum is not case-sensitive, only the content is relevant.

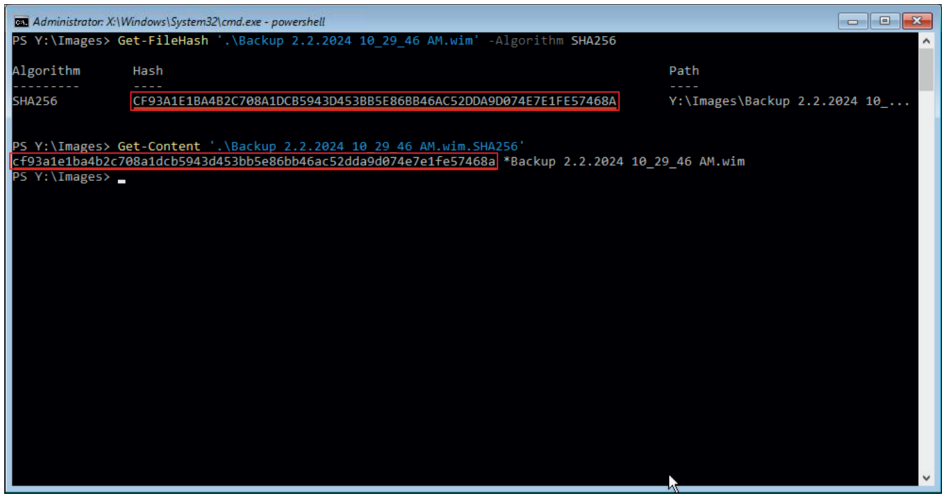


Fig. 5: Comparison in PowerShell example tool

6.2 Using Easy mode

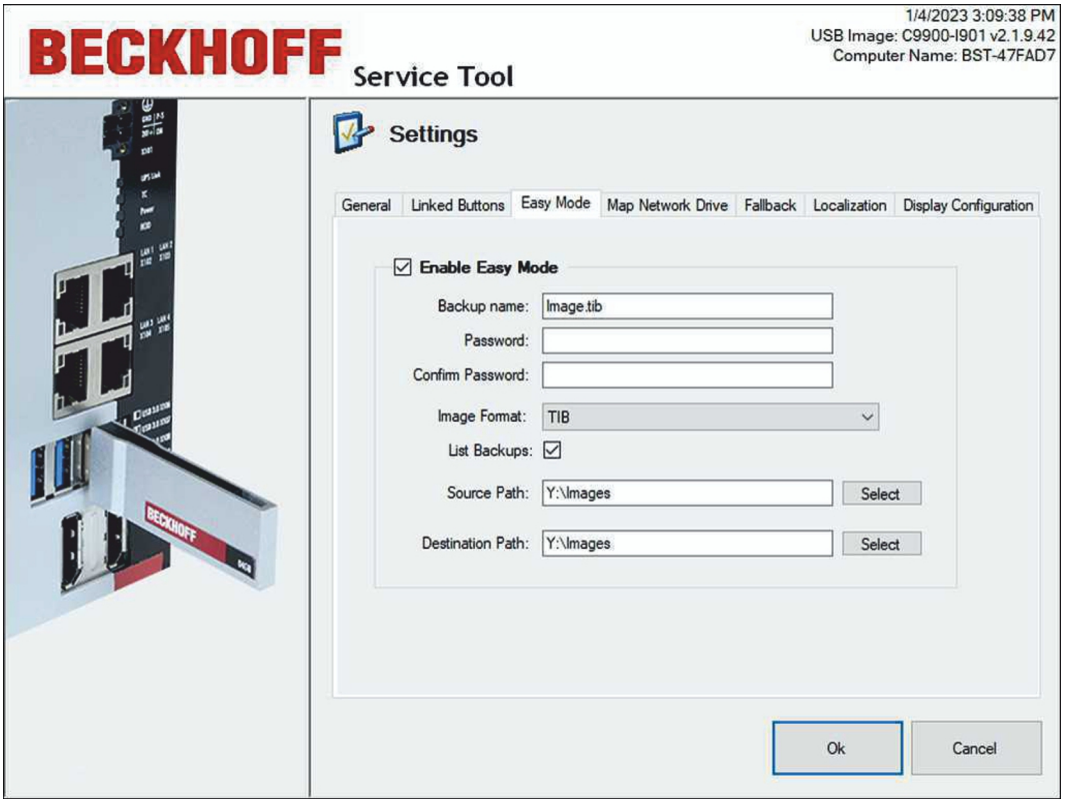
With Easy mode enabled, you can create or restore images by clicking the **Backup** or **Restore** button. The installation dialog is dispensed with and the procedure is automated. To do this, you need to configure the BST with default settings.

Requirements:

- A previously created image on the BST stick or a network drive, if you want to restore an image.

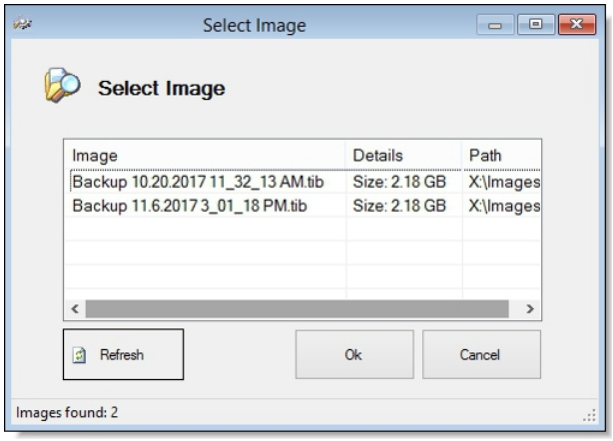
Use the Easy mode as follows:

1. Click on the **Settings** button and then on the **Easy mode** tab.
2. Click on **Enable Easy mode**.



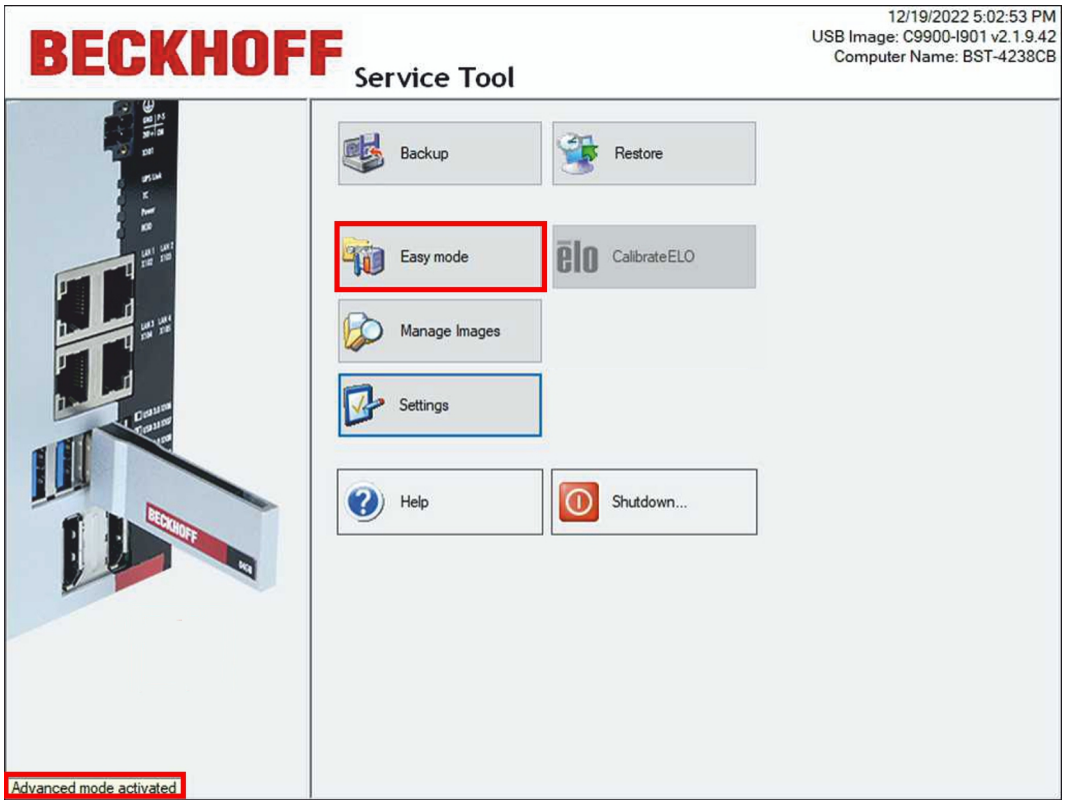
3. Enter the file name for the image to be created in the **Backup name** field.
4. If required, enter a password to encrypt the image.
5. Select the appropriate image format. You can choose between the TIB or WIM format.

6. Activate **List Backups** to display all images located under **Source Path** in the directory. If you have only one image, you do not need this option.
   If activated, the **Select Image** window is displayed as soon as you click **Restore** on the start page.



7. Under **Source Path**, state the directory that the image should be restored from.
   If there are multiple images in the directory, the current image from the directory is restored by default. Alternatively, you can activate the **List Backups** option.
8. Under **Destination Path**, specify the path that the image should be stored under.

⇨ Check the settings and click **Ok**. In the next step, you can create or restore images automatically, i.e. without an installation dialog, using the **Backup** and **Restore** buttons.
You can switch the Easy mode on or off on the start page using the **Easy mode** or **Advanced mode** buttons.



6.3 Manage images

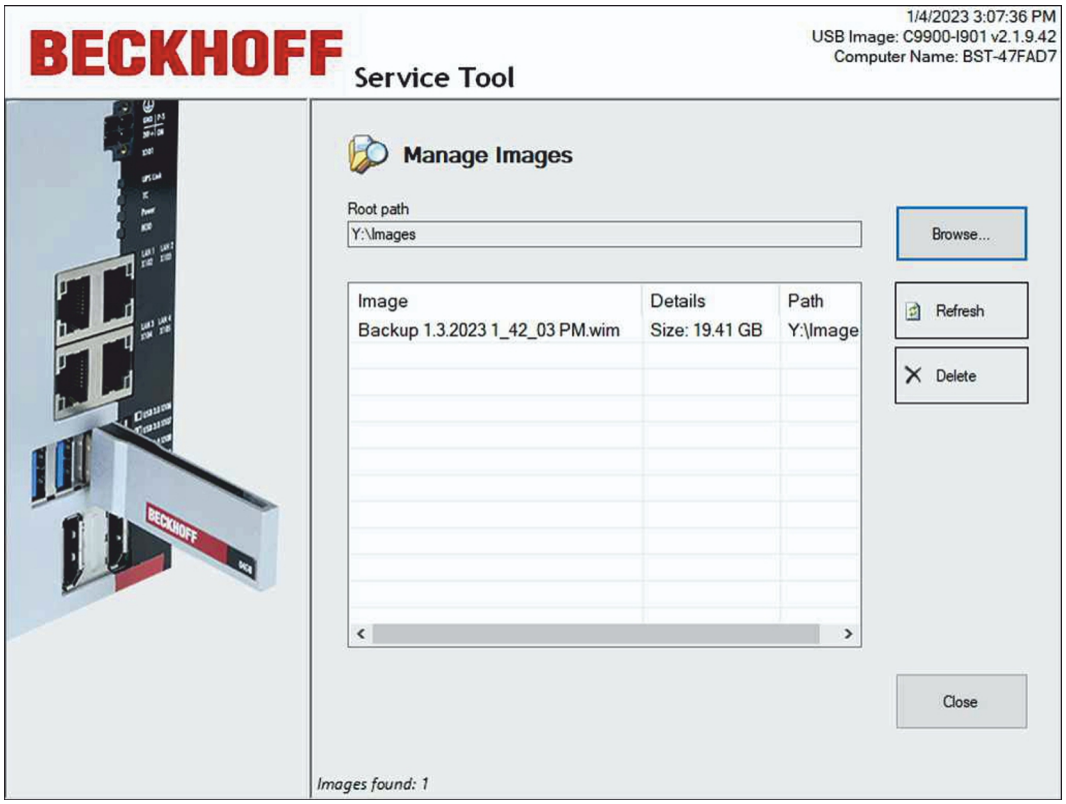
In this step, the images stored on the BST stick or in the network are displayed. If required, you can delete the images. Additional information such as file name, size and path is displayed, depending on the images.

Requirements:

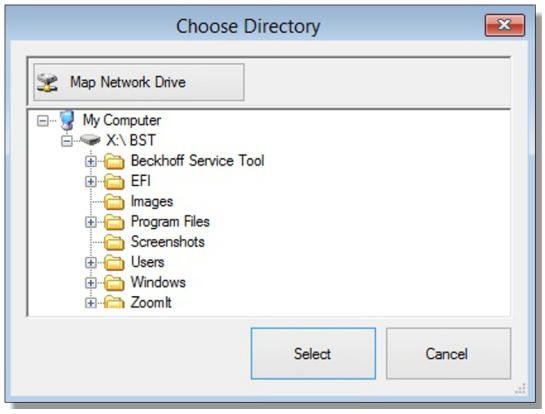
- You have already created images.

Proceed as follows:

1. Click the **Manage Images** button.



2. Click the **Browse** button to change the path to the images. Use the **Map Network Drive** button to integrate a network drive.



3. Click an image and then click the **Delete** button to delete an image.

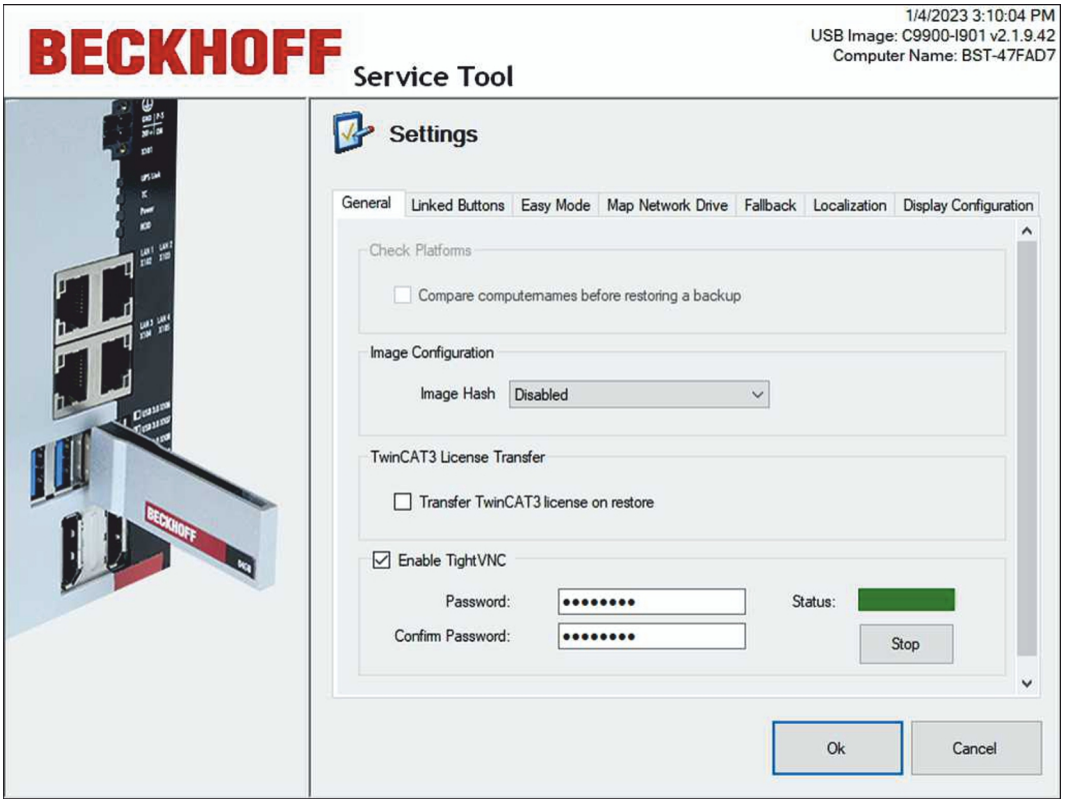
6.4 TwinCAT license transfer in case of image change

To transfer an existing license to a new image during an image change, you can use the TwinCAT 3 license transfer function. The function is only available for BST version 2.1.x.xx. You can use the TwinCAT 3 license transfer if you want to upgrade or change from one image version to another.

As soon as a backup is restored, the license of the old image is backed up and copied to the new image after the restore, without losing the validity of the license. It is irrelevant for the procedure whether it is a TwinCAT 3 volume license or a normal TwinCAT 3 license.

Proceed as follows:

1. On the start page, click **Settings** and then click the **General** tab.



2. Activate the option **TwinCAT 3 License Transfer**.
3. Start the restore process by clicking **Restore** in the main menu.

⇨ The existing license is first copied and temporarily stored on the USB stick. After successful restoring, the license file is automatically copied to the industrial PC.

6.5 Configuring Linked buttons

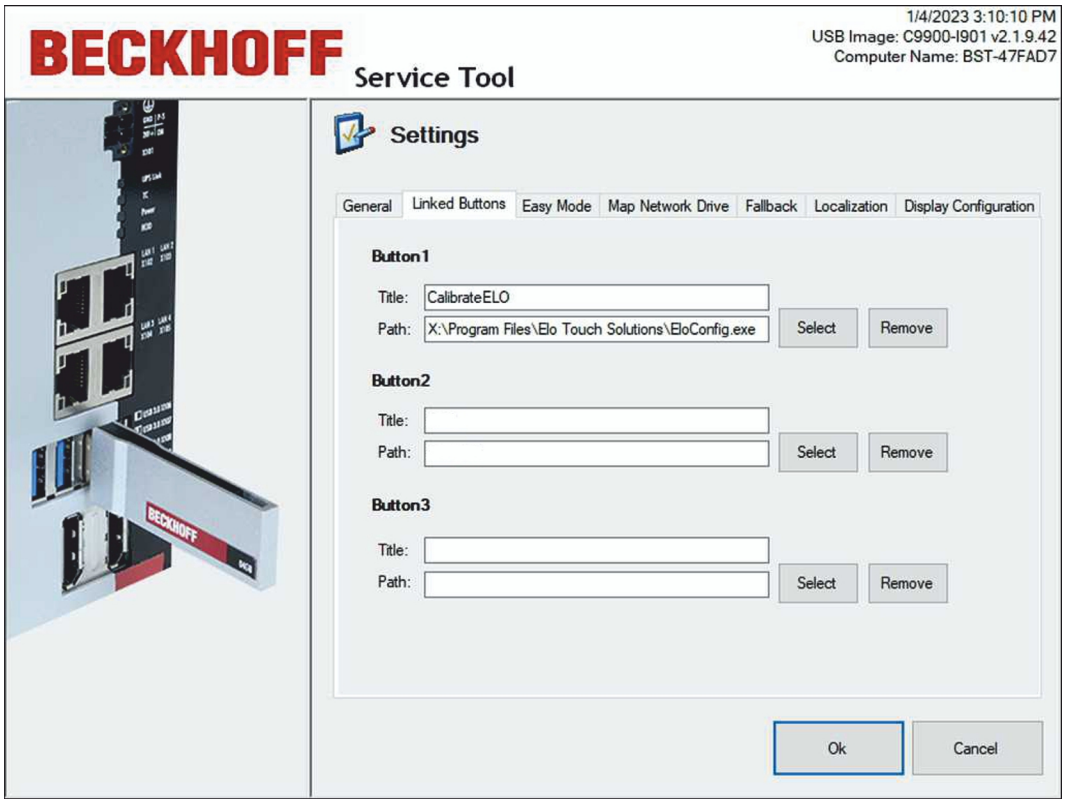
Linked Buttons can be used to create up to three custom buttons on the start page for running additional programs. You can set the label and path to match the program to be executed. You must first copy the additional programs to the BST stick.

Requirements:

- Additional programs are already on the BST stick.

Linked buttons can be configured as follows:

1. Click on the **Settings** button and then on the **Linked Buttons** tab.



2. Click **Select** and search for an executable file of the desired program (e.g. *.exe or *.bat) on the BST stick.
3. The file name is automatically inserted under **Title**. You can change the title if required.
4. Confirm your settings with **Ok**.

⇨ The custom buttons are displayed with the set captions on the BST start page. You can use **Remove** to delete the buttons at any time.

6.6 Connect to network drive

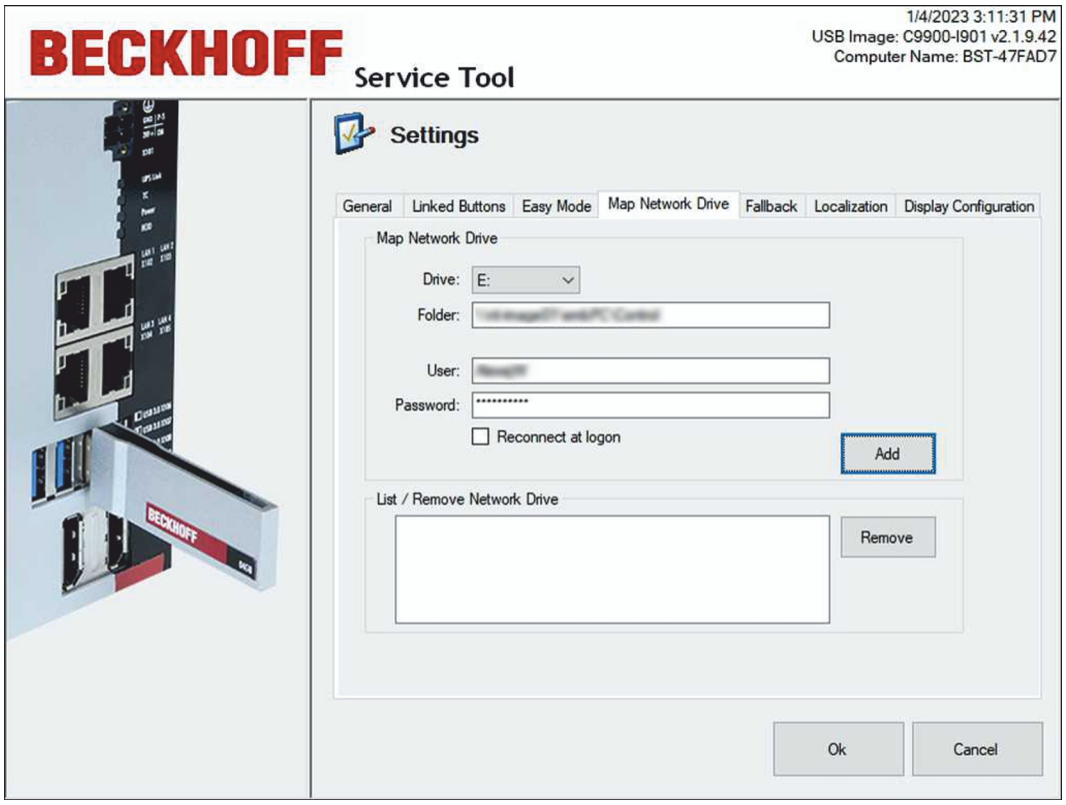
In this step you can connect your BST stick to a network drive. You can temporarily connect network drives to the BST stick, i.e. limited to the duration of the session. Or you can save a connection permanently, which is then still available after a restart of the Industrial PC.

Requirements:

- The Industrial PC is connected to a local network.

Connect a network drive as follows:

1. Click **Settings**, then click the **Map Network Drive** tab.



2. Select a drive letter under **Drive**.
3. Under **Folder**, specify the UNC path to the directory containing the images.
4. Enter a user with password if access to the directory is restricted.
5. You can use the **Reconnect at logon** option to permanently store a network drive and reuse it after restarting the Industrial PC.
6. Click **Add** to connect the network drive.
   If an error message appears, check whether the path or login information is correct.

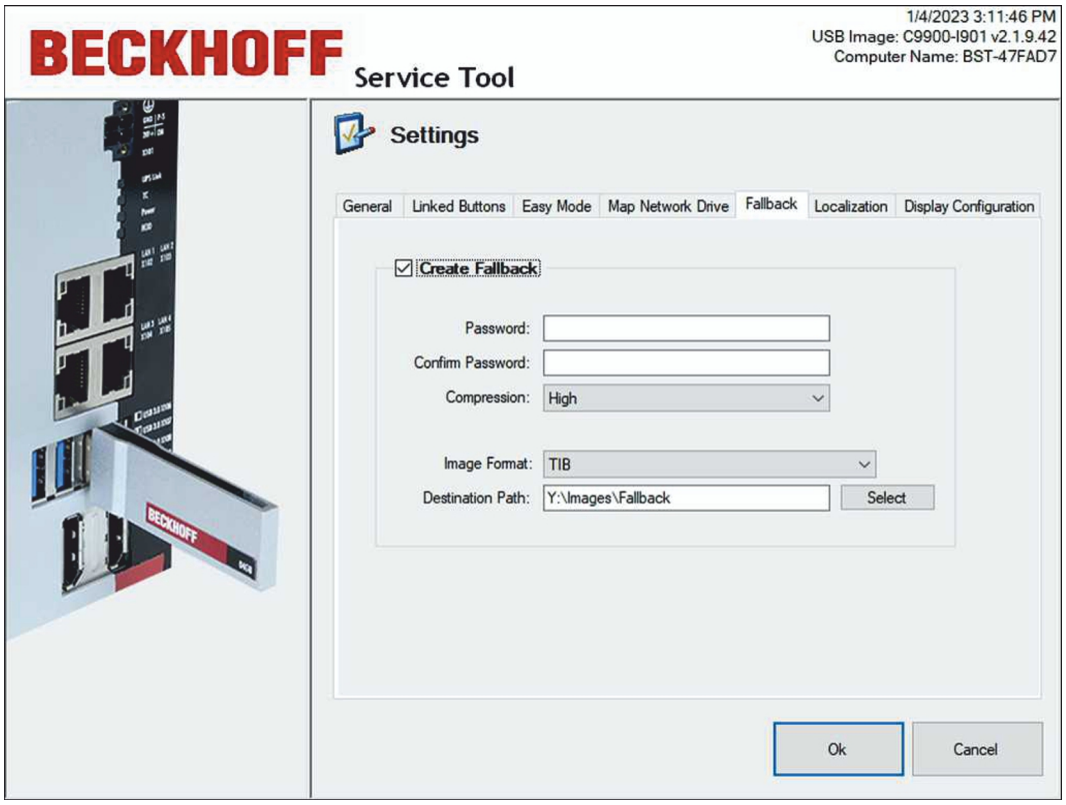
⇨ The connected network drive is displayed under **List / Remove Network Drive**. Permanently stored network drives can be deleted. To do this, select the network drive and click **Remove**.

6.7 Set up Fallback

With the Fallback option, a backup is always created from the industrial PC before a new image is restored on the industrial PC. This allows the original image to be restored in case of an error, so that the industrial PC remains functional.

Proceed as follows:

1. Click on the **Settings** button and then on the **Fallback** tab.



2. Enable the **Create Fallback** option for additional settings.
3. You can enter a password to encrypt the image.
4. Under **Compression**, select the compression level for the image.
5. You can enable the **Check Disk** option to scan the file system for errors and correct them as required.
6. Under **Destination Path**, specify the directory in which the backup is to be saved.

⇨ Before the image is restored, a backup is created from the original image and saved under the specified directory.

7 Error handling and diagnostics

In BST version 2.1.9.42, the TwinCAT LED of the industrial PC is used to output the current status. A TwinCAT LED is not available on every type of industrial PC:

Table 3: TwinCAT diagnostic LED.

Color	Description
Blue	Started, ready for use
Yellow	Backup or restore in progress
Green	Backup or restore successful
Red	Backup or restore stopped with error or (manually) aborted

8 Appendix

8.1 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

Download finder

Our download finder contains all the files that we offer you for downloading. You will find application reports, technical documentation, technical drawings, configuration files and much more.

The downloads are available in various formats.

Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for local support and service on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on our internet page: www.beckhoff.com

You will also find further documentation for Beckhoff components there.

Beckhoff Support

Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline:	+49 5246 963-157
e-mail:	support@beckhoff.com

Beckhoff Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

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