SIEMENS

SINUMERIK

SINUMERIK ONE
Creating a SINUMERIK Service System

Installation Manual

Valid for:

CNC software for SINUMERIK ONE V6.14
SINUMERIK service system V6.00.78.00
Windows 10

10/2020
A5E50529730B AA

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ **DANGER**
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ **WARNING**
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ **CAUTION**
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ **WARNING**
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

SINUMERIK documentation

The SINUMERIK documentation is organized into the following categories:

- General documentation/catalogs
- User documentation
- Manufacturer/service documentation

Additional information

You can find information on the following topics at the following address (https://support.industry.siemens.com/cs/de/en/view/108464614):

- Ordering documentation/overview of documentation
- Additional links to download documents
- Using documentation online (find and search in manuals/information)

If you have any questions regarding the technical documentation (e.g. suggestions, corrections), please send an e-mail to the following address (mailto:docu.motioncontrol@siemens.com).

mySupport/Documentation

At the following address (https://support.industry.siemens.com/My/ww/en/documentation), you can find information on how to create your own individual documentation based on Siemens' content, and adapt it for your own machine documentation.

Training

At the following address (http://www.siemens.com/sitrain), you can find information about SITRAIN (Siemens training on products, systems and solutions for automation and drives).

FAQs

You can find Frequently Asked Questions in the Service&Support pages under Product Support (https://support.industry.siemens.com/cs/de/en/ps/faq).

SINUMERIK

You can find information about SINUMERIK at the following address (http://www.siemens.com/sinumerik).

Target group

This documentation is intended for planning, project and commissioning engineers.

Benefits

This documentation enables the target group to install the SINUMERIK service system on a USB flash drive and uses an example to describe how to upgrade the control system.

Notation

The **SINUMERIK service system (eboot)** is also known as the emergency boot system for NCU and is available via the usual sales channels. The term "SINUMERIK service system" is used in the description.

Note regarding the General Data Protection Regulation

Siemens observes standard data protection principles, in particular the principle of privacy by design. That means that

this product does not process / store any personal data, only technical functional data (e.g. time stamps). If a user links this data with other data (e.g. a shift schedule) or stores personal data on the same storage medium (e.g. hard drive) and thus establishes a link to a person or persons, then the user is responsible for ensuring compliance with the relevant data protection regulations.

Technical Support

Country-specific telephone numbers for technical support are provided on the Internet at the following address (https://support.industry.siemens.com/sc/ww/en/sc/2090) in the "Contact" area.

If you have any technical questions, use the online form in the "Support Request" area.

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Fundamental safety instructions

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1.1 General safety instructions

⚠ WARNING

Electric shock and danger to life due to other energy sources

Touching live components can result in death or severe injury.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, the following steps apply when establishing safety:

1. Prepare for disconnection. Notify all those who will be affected by the procedure.
2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
3. Wait until the discharge time specified on the warning labels has elapsed.
4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
5. Check whether the existing auxiliary supply circuits are de-energized.
6. Ensure that the motors cannot move.
7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water. Switch the energy sources to a safe state.
8. Check that the correct drive system is completely locked.

After you have completed the work, restore the operational readiness in the inverse sequence.

⚠ WARNING

Electric shock due to connection to an unsuitable power supply

When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage. Contact with hazardous voltage can result in severe injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV- (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.

⚠ WARNING

Electric shock due to equipment damage

Improper handling may cause damage to equipment. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
- Do not use any damaged devices.

⚠ WARNING

Electric shock due to unconnected cable shields

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the cores of cables that are not used at one end at the grounded housing potential.

⚠ WARNING

Electric shock if there is no ground connection

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.

NOTICE

Damage to equipment due to unsuitable tightening tools.

Unsuitable tightening tools or fastening methods can damage the screws of the equipment.

- Be sure to only use screwdrivers which exactly match the heads of the screws.
- Tighten the screws with the torque specified in the technical documentation.
- Use a torque wrench or a mechanical precision nut runner with a dynamic torque sensor and speed limitation system.

⚠ WARNING

Spread of fire from built-in devices

In the event of fire outbreak, the enclosures of built-in devices cannot prevent the escape of fire and smoke. This can result in serious personal injury or property damage.

- Install built-in units in a suitable metal cabinet in such a way that personnel are protected against fire and smoke, or take other appropriate measures to protect personnel.
- Ensure that smoke can only escape via controlled and monitored paths.

⚠ WARNING

Unexpected movement of machines caused by radio devices or mobile phones

Using radio devices or mobile telephones in the immediate vicinity of the components can result in equipment malfunction. Malfunctions may impair the functional safety of machines and can therefore put people in danger or lead to property damage.

- Therefore, if you move closer than 20 cm to the components, be sure to switch off radio devices or mobile telephones.
- Use the "SIEMENS Industry Online Support app" only on equipment that has already been switched off.

⚠ WARNING

Fire due to inadequate ventilation clearances

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

NOTICE

Overheating due to inadmissible mounting position

The device may overheat and therefore be damaged if mounted in an inadmissible position.

- Only operate the device in admissible mounting positions.

⚠ WARNING

Unexpected movement of machines caused by inactive safety functions

Inactive or non-adapted safety functions can trigger unexpected machine movements that may result in serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for Safety Integrated functions

If you want to use Safety Integrated functions, you must observe the safety notices in the Safety Integrated manuals.

⚠ WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

1.2 Equipment damage due to electric fields or electrostatic discharge

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.

NOTICE

Equipment damage due to electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.3 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

1.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity (https://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/industrialsecurity (https://new.siemens.com/global/en/products/services/cert.html#Subscriptions).

Further information is provided on the Internet:

Industrial Security Configuration Manual (https://support.industry.siemens.com/cs/ww/en/view/108862708)

⚠ WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- On completion of commissioning, check all security-related settings.

1.5 Residual risks of power drive systems

When assessing the machine- or system-related risk in accordance with the respective local regulations (e.g., EC Machinery Directive), the machine manufacturer or system installer must take into account the following residual risks emanating from the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance, and repairs caused by, for example,
   - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
   - Response times of the control system and of the drive
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - Parameterization, programming, cabling, and installation errors
   - Use of wireless devices/mobile phones in the immediate vicinity of electronic components
   - External influences/damage
   - X-ray, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
   - Component failure
   - Software errors
   - Operation and/or environmental conditions outside the specification
   - External influences/damage
3. Hazardous shock voltages caused by, for example:
   - Component failure
   - Influence during electrostatic charging
   - Induction of voltages in moving motors
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly
6. Influence of network-connected communication systems, e.g. ripple-control transmitters or data communication via the network

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

Creating a SINUMERIK Service System 2

2.1 Overview

Purpose

In case service is needed, create the portable SINUMERIK service system or "Emergency Boot System" (EBS) on a USB flash drive. This enables you to start booting the NCU from the service system and to carry out various service tasks, such as data backup or updates, in a service menu.

There are two partitions on the service system:

- A Linux partition that is not displayed under Windows.
- An FAT partition, to backup files or save software updates.
  The FAT partition can be read and written to under Linux as well as from a Windows system.
  The FAT partition can be addressed under the `/data` path in a command shell under Linux.

NOTICE
Cancel the prompt for formatting! In Windows 10, a prompt for formatting the data storage medium appears when plugging in the USB flash drive. Acknowledge this prompt with "Cancel".

More information

More information on using the SINUMERIK service system can be found in the Installation Manual under New Installation and Upgrade.

Scope of delivery

The following files are supplied for creating a service system on a USB flash drive:

- The executable file installdisk.exe
- The Access MyMachine /P2P application
- An image file linuxbase.img for the USB flash drive

Directory of image file and installdisk.exe:
`\Vol_hmi-sl\standard\emergency_bootsys_ncu\eboot_system\...`

Requirement

- Flat-bladed screwdriver for the NCK rotary switch
- For the service system, a bootable USB flash drive with approx. 16 GB capacity

Recommendation

The preferred option is to use a Siemens USB flash drive, e.g.:

6AV6881-0AS42-0AA0

Note

To create the service system, you need administrator rights.

All data already on the USB flash drive will be deleted.

Data transfer is optimized for USB 3.0. This is why transfer to the USB flash drive using USB 2.0 takes longer than with USB 3.0.

Procedure

1. You have the following options for installing the service system on a USB flash drive:
   - Conventionally, via the Windows input prompt and the installdisk.exe (Page 16) program
   - With the aid of the Access MyMachine /P2P (Page 17) application
2. The SINUMERIK service system is fully created when the FAT partition of the USB flash drive has been set up by means of the initial booting with the NCU (Page 18).
3. Use the SINUMERIK service system for a software update on the SINUMERIK ONE (Page 21), for example.

2.2 How to create the service system for the NCU in the conventional way

Proceed as follows

To create a service system on a USB flash drive:

1. Copy the image file of the service system and all Installdisk program data to a local folder on your PG/PC, e.g. into the `/installdisk` folder.
2. Connect the USB flash drive to the USB interface of the PG/PC.
3. In the Windows Explorer, find out which drive letter has been assigned to the USB flash drive, e.g. H:
4. Format the USB flash drive.
5. Call the command prompt as the administrator.
   For example, enter `cmd` in the Windows Search box then, in the results field, right-click the Command Prompt application and select "Run as Administrator".
6. At the command prompt, switch to the folder in which the files for the service system are stored, e.g. using the command `cd \installdisk`.
7. Enter the following command at the command prompt:
   `installdisk --verbose --blocksize 1m linuxbase.img h:`
   The image is written to the USB flash drive.

Note

Special feature relating to the FAT partition

The FAT partition is not set up completely or at the right size until the service system is started up on the NCU for the first time.

Any data stored beforehand is lost during this process!

More information is available in Chapter "This is how you operate the service system (Page 18)".

2.3 How to create the service system for the NCU using Access MyMachine

Proceed as follows

To create a service system on a USB flash drive:

1. Copy the service system onto a local hard disk of your PG/PC.
2. Connect the USB flash drive to the USB interface of the PG/PC.
3. In the Windows Explorer, find out which drive letter has been assigned to the USB flash drive, e.g. H:
4. Format the USB flash drive.
5. Open the program Access MyMachine /P2P.
6. In the menu bar of the program, click "Options" → "Write image to CF card...".
   Dialog box "Write image to CF card..." opens.
7. In the dialog box, select an image file (*.img) and drive letter (e.g. H:\) for the memory medium.
8. Click "Write".
   The image is written to the USB flash drive.

Note

Special feature relating to the FAT partition

The FAT partition is not set up completely or at the right size until the service system is started up on the NCU for the first time.

Any data stored beforehand is lost during this process!

More information is available in Chapter "This is how you operate the service system (Page 18)".

2.4 This is how you operate the service system

Connecting the service system, the first startup

Procedure:

1. Switch off the system.
2. Set the NCK rotary switch to a position ≠ 0.
3. Connect the USB flash drive to the USB interface X125 or X135 of the NCU.
4. Switch the system on again.
5. The service system is unzipped from the USB flash drive when the NCU boots for the first time. Only then can the USB flash drive be used as service system and the complete storage capacity is available.

Note

After the initial booting, the following is displayed on the NCU:

- The 7-segment display is off.
- The RDY LED lights up green.
- The ERR LED flashes red.

Operating the service system

Keys and softkeys to navigate in the service system:

Softkey	Key on the OP	External keyboard	Description
↓	HSK1	<F1>	Moves the cursor down a row
↑	HSK2	<F2>	Moves the cursor up a row
Page↓	HSK3	<F3>	Moves the cursor down a page
Page↑	HSK4	<F4>	Moves the cursor up a page
Char↓	HSK5	<F5>	Inserts text or digits
Char↑	HSK6	<F6>	Inserts text or digits
Cancel	VSK7	<Shift> + <F7>	Cancel / Return
Ok	VSK8	<Shift> + <F8>	OK / Confirm
---	NEXT WINDOW	Pos1	Moves the cursor to the top row
---	END	End	Moves the cursor to the bottom row

Note

Operation with touch panels

The service system supports touch operation. The input fields are touch operated and the integrated keyboard automatically appears.

For example: SINUMERIK OP 019 black, SIMATIC HMI Industrial Thin Client

Example of SINUMERIK ONE software update 3

3.1 Introduction to software update

Example

You have the option of initiating an update or upgrade of the CNC software by means of a USB flash drive.

Note

A software update is possible for CNC software version 6.14 or higher. An update from other software versions is not permitted. In this case, a new installation is required.

Data backup before the software update

During a software update, all user data on the SD card in the `/user`, `/addon` and `/oem` directories is retained along with the license key.

Nevertheless, perform a data backup before every software update:

All machine data (backup) as *.dsf files

Note

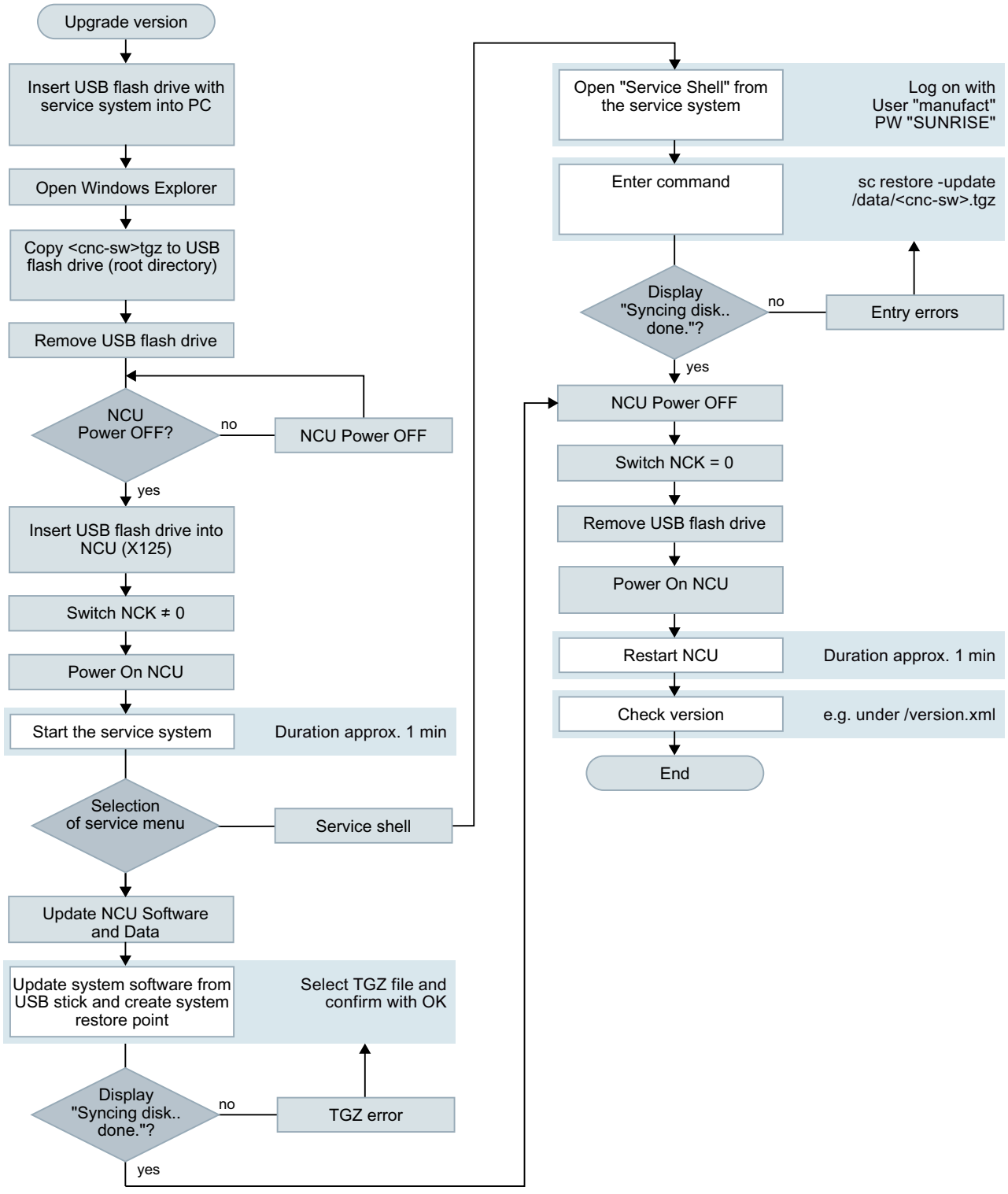
The licenses are permanently assigned to the SD card (card ID) and can only be used on this card.

More information

More information on data backup can be found in the system manual under Create MyVirtual Machine.

3.2 Update of the CNC software using SINUMERIK service system

Flow diagram



Note

System restore point

After unzipping the update/upgrade file, the service system automatically creates a system restore point (with snapshot files) for restoring the latest software version.

The snapshot files are overwritten with each new update/upgrade!

If necessary, copy the snapshot files to another system using Access MyMachine /P2P, for example. The snapshot files can be found in the `/install` folder on the SD card.

Appendix A

A.1 Notes on the software

Remarks

Version	Note	Remark
V06.00.78.00	Improvements	System restore from USB possible with empty system partition.
V06.00.71.00		• Disable or enable internal HMI, elimination of waiting time before the NCU may be switched off. • HMI default data, "OEM" folder is also deleted
V06.00.62.00		Support for PPU1740
V06.00.51.00		In certain versions of the SD card image the ext4 journal – which can assist in reconstructing the status of the file system after powering down – is missing. This journal is now included. It is strongly recommended that the journal be created retrospectively in existing systems (all pilot machines). **Note:** Boot the NCU using the service system and perform "Check Storage Integrity" under diagnostics. This concerns SD card shipments up to October 2019.

Restrictions

Version	Restriction
V06.00.78.00	None
V06.00.71.00	
V06.00.51.00	

A.2 Documentation overview SINUMERIK ONE

Comprehensive documentation about the functions provided in SINUMERIK ONE Version 6.13 and higher is provided in the Documentation overview SINUMERIK ONE (https://support.industry.siemens.com/cs/ww/en/view/109768483).

You can display documents or download them in PDF and HTML5 format.

The documentation is divided into the following categories:

- User: Operating
- User: Programming
- Manufacturer/Service: Functions
- Manufacturer/Service: Hardware
- Manufacturer/Service: Configuration/Setup
- Manufacturer/Service: Safety Integrated
- Information and training
- Manufacturer/Service: SINAMICS

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