SIEMENS

SINUMERIK ONE

SINUMERIK
Migration to a SINUMERIK ONE

System Manual

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Valid for:
Create MyVirtual Machine V1.5.1
SINUMERIK ONE
SINUMERIK CNC software V6.25 SP1
SINUMERIK STEP 7 Toolbox V20
SIMATIC STEP 7 as of V5.5 SP4

07/2025
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Legal information

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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 persons are those who, because of their training and experience, are familiar with the installation, assembly, commissioning, operation, decommissioning and disassembly of the product and can recognize risks and avoid possible hazards.

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Note the following:

⚠ **WARNING**
Siemens products may only be used for the application described in the catalog and the associated usage information. 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.

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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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1 Introduction

1.1 About SINUMERIK

From simple, standardized CNC machines to premium modular machine designs – the SINUMERIK CNCs offer the right solution for all machine concepts. Whether for individual parts or mass production, simple or complex workpieces – SINUMERIK is the highly dynamic automation solution, integrated for all areas of production. From prototype construction and tool design to mold making, all the way to large-scale series production.

Visit our website for more information SINUMERIK (https://www.siemens.com/sinumerik).

1.2 About this documentation

Target group

This document addresses project engineers, technologists (of the machine manufacturers), commissioning engineers (for systems or machines), programmers.

Purpose

This documentation describes the procedure for the system migration from a SINUMERIK 840D sl to a SINUMERIK ONE. Because the TIA Portal is prerequisite for configuring this CNC system and programming the PLC, these descriptions also contain the migration of the PLC project.

Benefits

This migration manual enables the target group to migrate SINUMERIK 840D sl projects into a SINUMERIK ONE project.

Standard scope

This documentation only describes the functionality of the standard version. This may differ from the scope of the functionality of the system that is actually supplied. Please refer to the ordering documentation only for the functionality of the supplied drive system.

It may be possible to execute other functions in the system which are not described in this documentation. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

For reasons of clarity, this documentation cannot include all of the detailed information on all product types. Further, this documentation cannot take into consideration every conceivable type of installation, operation and service/maintenance.

The machine manufacturer must document any additions or modifications they make to the product themselves.

Websites of third-party companies

This document may contain hyperlinks to third-party websites. Siemens is not responsible for and shall not be liable for these websites and their content. Siemens has no control over the information which appears on these websites and is not responsible for the content and information provided there. The user bears the risk for their use.

1.3 Documentation on the internet

1.3.1 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: Configuring/Commissioning
- Manufacturer/Service: Safety Integrated
- Information and training
- Manufacturer/Service: SINAMICS

1.3.2 Documentation overview SINUMERIK 840D sl

You will find extensive documentation on the functions of SINUMERIK 840D sl from version 4.8 SP4 at 840D sl documentation overview (https://support.industry.siemens.com/cs/ww/en/view/109766213).



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: Configuring/Commissioning
- Manufacturer/Service: Safety Integrated
- Manufacturer/Service: SINUMERIK Integrate/MindApp
- Information and training
- Manufacturer/Service: SINAMICS

1.3.3 Documentation overview SINUMERIK operator components

Comprehensive documentation about the SINUMERIK operator components is provided in the Documentation overview SINUMERIK operator components (https://support.industry.siemens.com/cs/document/109783841/technische-dokumentation-zu-sinumerik-bedienkomponenten?dti=0&lc=en-WW).

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

The documentation is divided into the following categories:

- Operator panels
- Handheld unit/Mini handheld devices

- Machine control panels
- Further operator components

An overview of the most important documents, entries and links on the topic of "SINUMERIK" is provided at SINUMERIK Overview - Topic Page (https://support.industry.siemens.com/cs/document/109766201/sinumerik-an-overview-of-the-most-important-documents-and-links?dti=0&lc=en-WW).

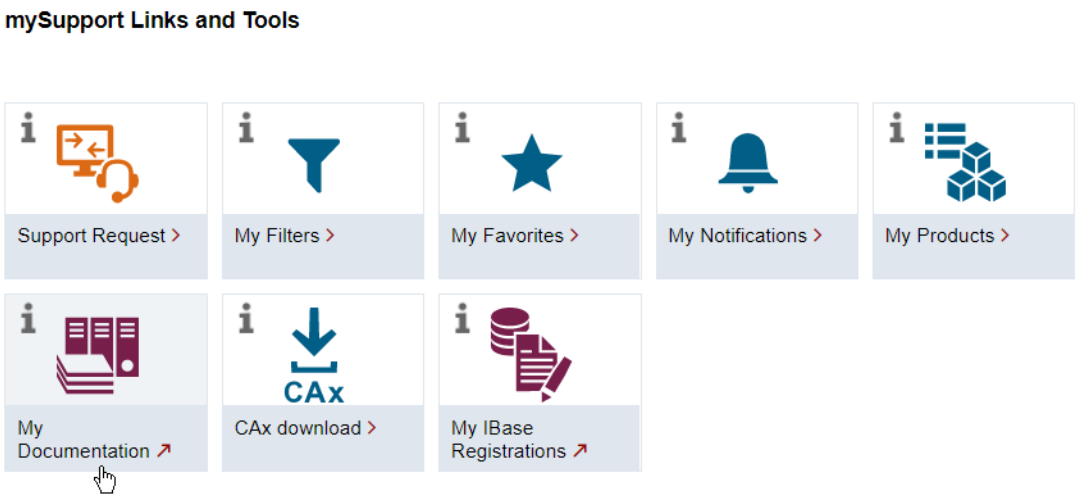
1.4 Feedback on the technical documentation

If you have any questions, suggestions, or corrections regarding the technical documentation published in the Siemens Industry Online Support, use the "Provide feedback" link which appears at the end of the entry.

1.5 mySupport documentation

With the "mySupport documentation" web-based system you can compile your own individual documentation based on Siemens content, and adapt it for your own machine documentation.

To start the application, click on the "My Documentation" tile on the "mySupport links and tools" (https://support.industry.siemens.com/cs/ww/en/my) portal page:



The configured manual can be exported in RTF, PDF or XML format.

Note

Siemens content that supports the mySupport documentation application can be identified by the presence of the "Configure" link.

1.6 Service and Support

Product support

You can find more information about products on the internet:

Product support (https://support.industry.siemens.com/cs/ww/en/)

The following is provided at this address:

- Up-to-date product information (product announcements)
- FAQs (frequently asked questions)
- Manuals
- Downloads
- Newsletters with the latest information about your products
- Global forum for information and best practice sharing between users and specialists
- Local contact persons via our Contacts at Siemens database (→ "Contact")
- Information about field services, repairs, spare parts, and much more (→ "Field Service")

Technical support

Country-specific telephone numbers for technical support are provided on the internet at address (https://support.industry.siemens.com/cs/ww/en/sc/4868) in the "Contact" area.

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

Training

You can find information on SITRAIN at the following address (https://www.siemens.com/sitrain).
SITRAIN offers training courses for automation and drives products, systems and solutions from Siemens.

Siemens support on the go



With the award-winning "Industry Online Support" app, you can access more than 300,000 documents for Siemens Industry products – any time and from anywhere. The app can support you in areas including:

- Resolving problems when implementing a project
- Troubleshooting when faults develop
- Expanding a system or planning a new system

Furthermore, you have access to the Technical Forum and other articles from our experts:

- FAQs
- Application examples
- Manuals
- Certificates
- Product announcements and much more

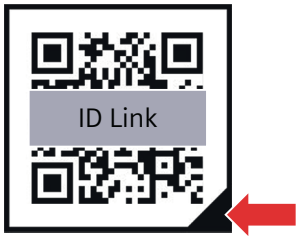
The "Industry Online Support" app is available for Apple iOS and Android.

Digital product information as QR code

The ID link according to IEC 61406 provides you with digital information about your product.

The ID link is a globally unique identifier and appears as a QR code on the product.

You can recognize the ID link by the frame with a black corner at the bottom right.



In addition to the digital nameplate you will find the following product information:

- Technical specifications
- FAQs
- Manuals
- Certificates
- Product announcements
- Application examples

1.7 Using OpenSSL

This product can contain the following software:

- Software developed by the OpenSSL project for use in the OpenSSL toolkit
- Cryptographic software created by Eric Young.
- Software developed by Eric Young

You can find more information on the internet:

- OpenSSL (https://www.openssl.org)
- Cryptsoft (https://www.cryptsoft.com)

1.8 Compliance with the General Data Protection Regulation

Overview

Siemens observes standard data protection principles, in particular the data minimization rules (privacy by design).

For the SINUMERIK Operate, this means:

The product processes/saves the following personal data:

- FullName (optional): Only if user management is activated
- User name + password: Only if user management is activated
- UserID: Only if user management is activated
- IP address
- Security events
- Time stamp

It does not involve data from the personal or private sphere.

The above data is required for the user log-in function. The storage of data is appropriate and limited to what is necessary, as it is essential for the identification of the authorized operator. (Mandatory here are: user name + password; the FullName is optional.)

The above-mentioned data cannot be stored anonymously or – with the exception of the user name – pseudonymously, as otherwise the purpose of identifying the operating personnel cannot be achieved.

Our products do not automatically delete the data mentioned above. The data and logs can be deleted manually by authorized personnel.

The above data is secured against loss of integrity and confidentiality by Industry State-of-the-Art Product Security mechanisms.

1.9 Notation

The following notation and abbreviations are used in this documentation:

Notation for SINUMERIK machine data (examples):

- MD13370 Machine data 13370
- $MN_SAFE_MODE Machine data type and symbolic name of the machine data
- MD15068[1] Machine data 15068 index 1
- MD15068[1].3 Machine data 15068 index 1 bit 3
- MD15068[0...3] Machine data 15068 index 0 to 3
- MD15068.4 Machine data 15068 bit 4

Notation for PLC blocks:

Startup [OB100] <block name>[<block type><block number>]

Notation for SINAMICS parameters (examples):

- p0918 Adjustable parameter 918
- r1024 Display parameter 1024
- p1070[1] Adjustable parameter 1070, index 1
- p2098[1].3 Adjustable parameter 2098, index 1 bit 3
- p0099[0...3] Adjustable parameter 99, indices 0 to 3
- r0945[2](3) Display parameter 945, index 2 of drive object 3
- p0795.4 Adjustable parameter 795, bit 4

Fundamental safety instructions 2

2.1 General safety instructions

⚠ WARNING

Danger to life if the safety instructions and residual risks are not observed

If the safety instructions and residual risks in the associated hardware documentation are not observed, accidents involving severe injuries or death can occur.

- Observe the safety instructions given in the hardware documentation.
- Consider the residual risks for the risk evaluation.

⚠ 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.

2.2 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 customer-specific solutions, but merely serve to provide assistance with 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.

2.3 Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity 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 cybersecurity 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 cybersecurity measures that may be implemented, please visit
https://www.siemens.com/cybersecurity-industry.

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 Cybersecurity RSS Feed under
https://new.siemens.com/cert.

Further information is provided on the Internet:

Configuration Manual Industrial Cybersecurity (https://support.industry.siemens.com/cs/ww/en/view/109975311)

⚠ 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 state-of-the-art, integrated industrial cybersecurity concept for the installation or machine.
- Make sure that you include all installed products in the integrated industrial cybersecurity concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- Carefully check all cybersecurity-related settings once commissioning has been completed.

Overview

3

3.1 General

SINUMERIK ONE is available as a real controller and also as a virtual controller (Create MyVirtual Machine). You can perform the system migration using the virtual control system Create MyVirtual Machine or also with the real control system SINUMERIK ONE. Descriptions for SINUMERIK ONE are also valid for Create MyVirtual Machine and are equitable in this regard.

Migration procedures that do not concern the SINUMERIK ONE are not described. An overview of the documentation for the various migration situations is available at Documentation landscape (Page 24). An overview of the migration steps (to a SINUMERIK ONE) is available at Overview of the migration procedure (Page 43).

SINUMERIK STEP 7 Toolbox contains various files and libraries that support the migration from SINUMERIK 840D sl to SINUMERIK ONE. For an overview, refer to the Included migration libraries (Page 30) section.

3.2 Documentation landscape

Table 3-1 SINUMERIK documentation landscape for the migration depending on the starting system and the target system

To **From**	SINUMERIK STEP 7 Toolbox V19 SINUMERIK 840D sl Safety Integrated (SPL)	SINUMERIK STEP 7 Toolbox V19 SP1 SINUMERIK 840D sl Safety Integrated plus (F-PLC)	SINUMERIK STEP 7 Toolbox V19 SP1 SINUMERIK ONE Safety Integrated (F-PLC)
STEP 7 V5.5 SP4 Toolbox SINUMERIK 840D sl (or higher) Safety Integrated (SPL)	• Getting Started SINUMERIK 840D sl STEP 7 Toolbox V19 SP1	• Getting Started SINUMERIK STEP 7 Toolbox V19 SP1 • Safety Integrated plus Commissioning Manual	• **This documentation** • SINUMERIK ONE Safety Integrated Commissioning Manual
SINUMERIK STEP 7 Toolbox V19 SP1 SINUMERIK 840D sl Safety Integrated (SPL)	N/A	• Safety Integrated plus Commissioning Manual	• **This documentation** • SINUMERIK ONE Safety Integrated Commissioning Manual
SINUMERIK STEP 7 Toolbox V19 SP1 SINUMERIK 840D sl Safety Integrated plus (F-PLC)	N/A	N/A	• **This documentation** • SINUMERIK ONE Safety Integrated Commissioning Manual

Further documentation for SINUMERIK ONE

For the installation, operation and commissioning of SINUMERIK ONE, consult the further documentation.

- Create MyVirtual Machine Installation Manual
  System prerequisite, installation procedure
- Create MyVirtual Machine System Manual
  Functions, operation and configuring
- SINUMERIK ONE Safety Integrated Commissioning Manual
- SINUMERIK ONE upgrade instructions

All documentation is available for download in the SINUMERIK ONE documentation overview (https://support.industry.siemens.com/cs/ww/en/view/109768483).

General information about migration

4

4.1 Preparations of the starting project

Assuming that you want to migrate from a STEP 7 V5.5 SP4 (or higher) project, you must perform several preparatory steps outside the TIA Portal:

Note

SIMATIC STEP 7 V5.5 SP4 and higher

The version of your starting project must be at least that of SIMATIC STEP 7 V5.5 SP4. The descriptions in this documentation for SIMATIC STEP 7 V5.5 SP4 also apply for projects which were created with versions > SIMATIC STEP 7 V5.5 SP4.



Check whether hardware components can be migrated

With "Readiness Check Totally Integrated Automation Portal" you can check whether the associated modules are supported in TIA Portal. If necessary, alternative modules are suggested.

Readiness Check Tool in the SIOS (https://support.industry.siemens.com/cs/document/60162195/)



Preparation of the PLC program in STEP 7 V5.5 SP4

Several necessary adaptations to the PLC program must be performed in STEP 7 V5.5 SP4.



Migration of projects with the migration tool

In many cases, the project that you want to migrate is not located on the same PG/PC on which the current version of the TIA Portal is installed. Consequently, the starting project must first be converted to a compatible format for the migration. The same applies to integrated projects.

You can you download the migration tool for converting the project from the SIOS Portal (https://support.industry.siemens.com/cs/document/58638200/).

Note

From version TIA Portal V20, the migration tool is no longer available on the TIA Portal setup DVD. Version V20 and previous versions of the migration tool can be found for download in the SIOS entry (https://support.industry.siemens.com/cs/document/60162195/).

Note

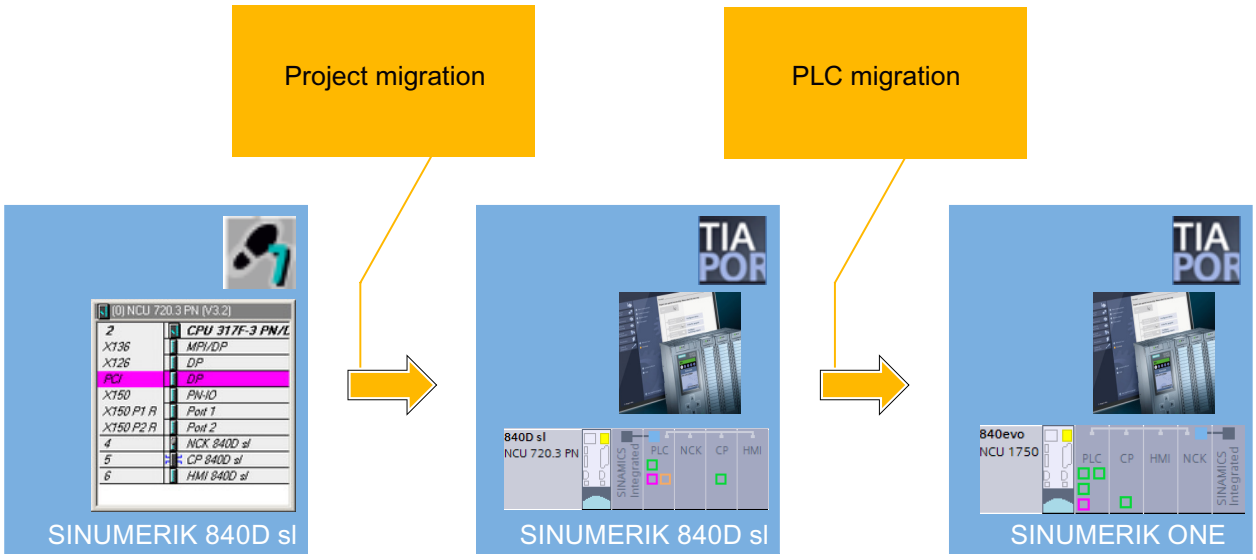
Backing up the starting system

Back up the starting project or system before beginning the migration so you can restore to the original at anytime.

To do this, for example, use a separately stored STEP 7 V5.5 SP4 project file and a SINUMERIK complete archive.

4.2 Types of migration

A differentiation is made between the various types of migration that are performed successively:



Project migration - migration of a project from STEP 7 V5.5 SP4 to the TIA Portal

The migration to the TIA Portal is called "Project migration". Whereby, all supported components of the STEP 7 V5.5 SP4 project are migrated, e.g.:

- SINUMERIK 840D sl, and configured peripherals and modules
- Hardware configuration and interconnection
- PLC program (PLC user program and SINUMERIK basic PLC program)

PLC migration - migration of the PLC program to a SINUMERIK ONE

The migration from 840D sl (PLC 300) to ONE (PLC 1500) is performed within the TIA Portal and is called "PLC migration":

- The SINUMERIK ONE is created in the project.
- The PLC program of the SINUMERIK 840D sl is copied to SINUMERIK ONE and adapted appropriately.
- The hardware configuration and the network settings of the starting module are not transferred automatically.
- The SINUMERIK 840D sl and the associated peripherals and modules remain unchanged in the project. The peripherals are not interconnected automatically with the SINUMERIK ONE.

The advantage of migration compared with copying is that the program is adapted automatically to the new CPU family as far as possible:

- Program structures that are no longer permitted are updated.
- Operations that are not available on the new module are replaced with corresponding S7-1500 operations.

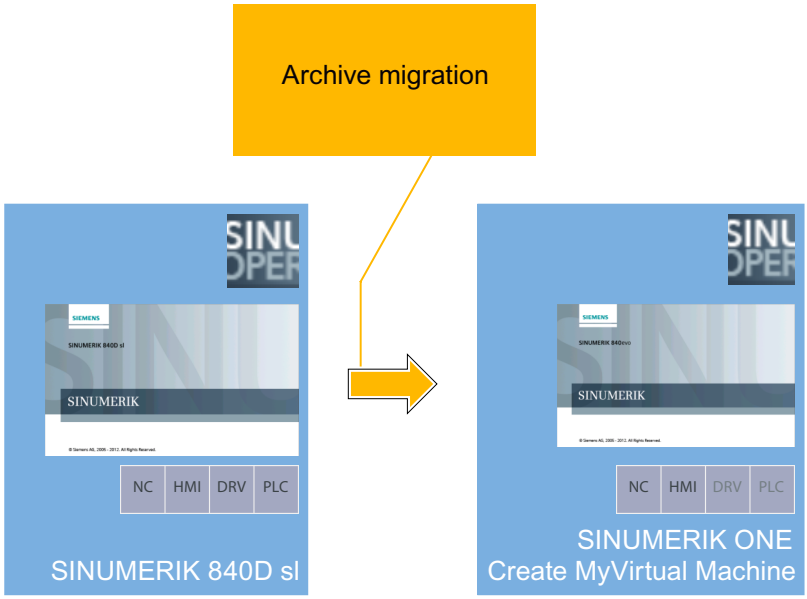
Although the migration to SINUMERIK ONE, S7-1500 or ET 200SP follows the same rules, it must be performed individually for each PLC program. The PLC programs are treated identical in both migration operations.

Note

No cross-migration of blocks with STEP 7 V5.5 SP4 know-how protection

Although blocks with STEP 7 V5.5 SP4 know-how protection can be migrated to the TIA Portal, they can no longer be edited and cannot be migrated to SINUMERIK ONE within the TIA Portal by the PLC migration.

Consider this for the migration and convert the know-how protection timely, as described in this documentation (Page 58).



SINUMERIK Archive Migration - Migration of NCK and HMI data to SINUMERIK ONE/ Create MyVirtual Machine

The migration of all other NCU data is designated as "SINUMERIK archive migration".

You can save all data of the NCU subcomponents in a SINUMERIK archive. You can read this archive into SINUMERIK ONE or Create MyVirtual Machine with SINUMERIK Operate. The supported data (currently NCK and HMI data) is imported and adapted accordingly for Create MyVirtual Machine. In the case of the real SINUMERIK ONE control system, the drive data can also be read in. In the following, only NCK and HMI data will be considered for the time being.

4.3 SINUMERIK archive migration restrictions

Potential error sources for modified machine data which are to be checked should be considered during migration of the NC archive of a SINUMERIK 840D sl into a SINUMERIK ONE.

Possible scenarios for archive migration are described as follows.

Insufficient user memory for PLC scaling

You created an NC archive on a SINUMERIK 840D sl and are importing the archive into a SINUMERIK ONE.

Case 1

After loading the archive, alarm 8081 "%1 option(s) is/are activated that are not licensed by the license key" is displayed

Cause

The machine data 19270 $ON_PLC_USER_MEM_SIZE in the archive has a value between **0 and 3**.

Remedy

- Change the value of the machine data to 0.

Result

The alarm 8081 no longer occurs. If alarm 8023 is additionally displayed, proceed as described for Case 2.

Case 2

After loading the archive (or change according to case 1), alarm 8023 "Too much PLC user memory used (%1kB)" is displayed.

Cause

More PLC user memory is required than specified in machine data 19270 $ON_PLC_USER_MEM_SIZE.

Remedy

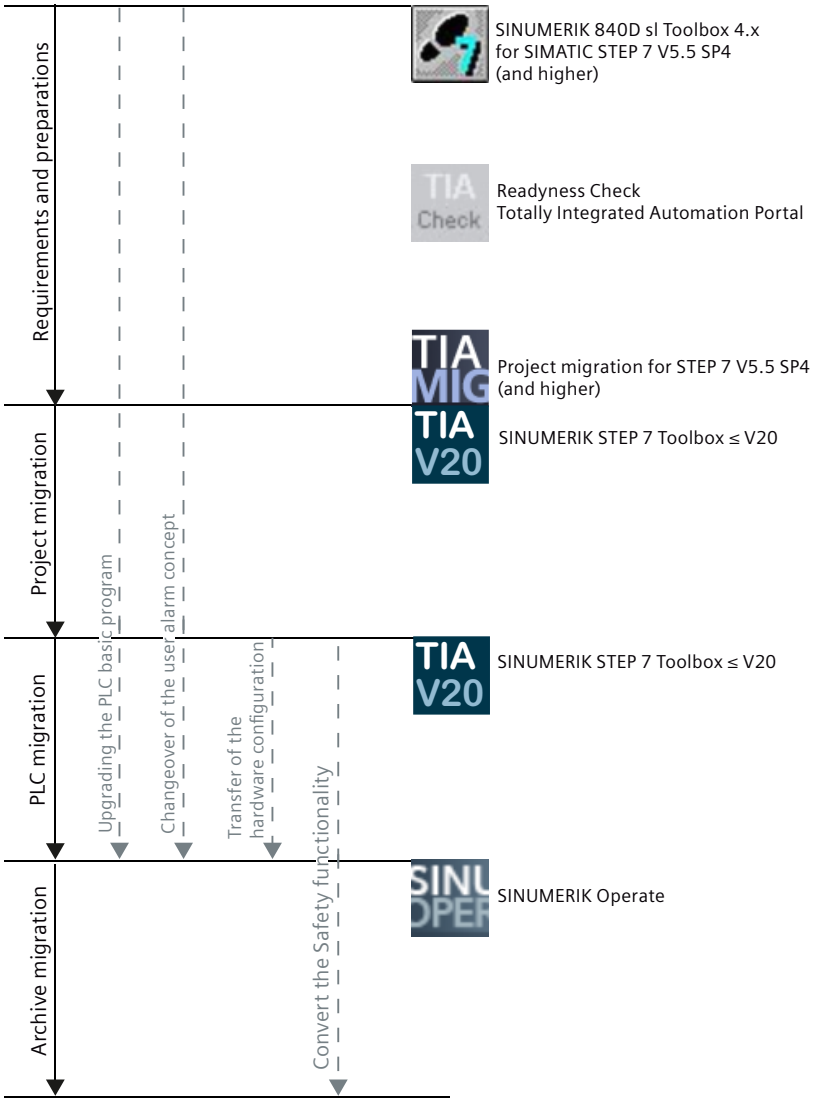
- Increase the value of the machine data in accordance with the displayed amount of memory used.
- To increase the additional PLC memory, the 6FC5800-0BD10-0YB0 option must be available and activated on the control.

Result

Alarm 8023 no longer occurs.

4.4 Deployed software

Various applications and tools that provide support for the various migration steps are available:



Note

With the installation of SINUMERIK STEP 7 Toolbox, the two components SINUMERIK 840D sl STEP 7 Toolbox and SINUMERIK ONE STEP 7 Toolbox are automatically installed.

Upgrading the PLC basic program

The SINUMERIK basic PLC program 6.x contains blocks in the new version with block names revised for SINUMERIK ONE that are adapted to the current standard. The system library is installed in the TIA Portal via the SINUMERIK STEP 7 Toolbox.

The symbols of the blocks have been changed in the context of TIA Portal and SINUMERIK ONE and the absolute addressing converted to symbolic addressing.

Principally, symbolic addressing is implemented for SIMATIC S7-1500 and for SINUMERIK ONE. The basic program uses symbolic programming and data blocks (classic DBs, no optimized DBs). As user you can use the optimized DBs as recommended for S7-1500. Absolute addressing is predominantly used for SIMATIC S7-300.

See also: Programming guidelines and programming style guide for S7-1200 and S7-1500 (https://support.industry.siemens.com/cs/document/81318674)

To ensure compatibility to your existing user program, you must consider the new block names for the migration. Depending on the starting system, begin the conversion in STEP 7 V5.5 SP4 or in the TIA Portal.

Converting the user alarm concept

SINUMERIK ONE is based on the current "Extended DB2 alarms" user alarm concept.

- The "ExtendAlMsg=False" user alarm concept is no longer supported. If you use this concept, you must convert to the extended DB2 alarms whose signals use different addresses and symbolic identifiers. Depending on the starting system, begin the conversion in STEP 7 V5.5 SP4 or in the TIA Portal.
- If you already deploy the extended DB2 alarm concept, it is migrated without any additional steps, provided you observe the general migration procedure in this document.

Transferring the hardware configuration

SINUMERIK STEP 7 Toolbox

The PLC migration adds a new SINUMERIK ONE with standard configuration to the TIA Portal. Consequently, after the PLC migration, the hardware configuration, telegram configuration, etc. of the SINUMERIK 840D sl must be transferred to the SINUMERIK ONE settings. Also interconnect the SINUMERIK ONE with the original or duplicated peripheral modules. Add the new NX modules and interconnect them with the SINUMERIK ONE.

Converting the Safety functionality

SINUMERIK Operate and SINUMERIK STEP 7 Toolbox

- As of SINUMERIK ONE, the integrated SINUMERIK Safety Integrated (SPL) safety concept is no longer supported.
- The new drive-based Safety Integrated safety concept combines the safety program known from SIMATIC with the drive-integrated SINAMICS Safety Functions, and integrates them in the SINUMERIK ONE.
- The drive-based Safety Integrated is designated differently for SINUMERIK 840D sl and SINUMERIK ONE.
  - SINUMERIK ONE: Safety Integrated
  - SINUMERIK 840D sl: SINUMERIK Safety Integrated plus

Accordingly, program the safety program in the TIA Portal and configure the drive-integrated safety functions with SINUMERIK Operate.

If you use the drive-based SINUMERIK Safety Integrated plus already on the SINUMERIK 840D sl, a few adaptations must be performed following migration to the SINUMERIK ONE.

Supplied migration files and libraries

SINUMERIK STEP 7 Toolbox contains various files and libraries that support the migration from SINUMERIK 840D sl to SINUMERIK ONE.

These files are located on the product DVD in the following directory:
<DVD>\Support\Migration\

File name	Used in	Purpose
840Dsl_MigrationDummyLib.zip	STEP 7 V5.5 SP4	This library replaces the know-how protected basic program blocks with migratable, non-know-how protected dummy blocks. Whereby, the interface DBs of the basic program are added to the project so it can be migrated. As migration preparation, FB4 is replaced with a variant that contains the extended interface of FB7. See: Addressing a DB that does not exist in the project (Page 40)
LBP_symbols_for_classic_UDT2.asc or LBP_symbols_for_classic_UDT1002.asc	STEP 7 V5.5 SP4	This symbol table assigns the symbolic names of the basic program V6.x blocks to the basic program V4.X blocks. See: Importing a symbol table with new symbolic names of the basic program blocks (Page 52)
SINUMERIK 840D sl Migration Dummy Library.zalXX	TIA Portal	This library replaces the know-how protected basic program blocks with migratable, non-know-how protected dummy blocks. See: Adding dummy blocks to know-how protected basic program blocks (Page 73)

4.5 Scope of migration

4.5.1 Scope of the PLC migration

The PLC migration migrates all components of the PLC program to the newly-created module. These include, for example:

- Program blocks of the SINUMERIK PLC basic program without know-how protection (with optional user-specific adaptations).
  See: PLC basic program (Page 34)
- Program blocks of the PLC user program whose creation language is supported by S7-1500, but do not have any know-how protection.
- PLC variable tables
- Monitoring and force tables
- PLC data types
- Technology objects
- User-defined groups in the project navigation

4.5.2 PLC basic program

With regard to the procedure and migration capability, the basic PLC program blocks differ as follows in this documentation:

- **Migratable basic PLC program blocks**: The basic PLC program blocks (mainly DB) that are migrated automatically to SINUMERIK ONE during the PLC migration.
  These blocks are migrated when you migrate a SINUMERIK 840D sl to a SINUMERIK ONE.
  - Interface DBs not present in the project in STEP 7 V5.5 SP4, but assigned only via the symbol table, are not created automatically during the project migration. These interface DBs can be migrated by adding them as global DB (Page 40) in the project prior to the migration.
- **Non-migratable basic PLC program blocks**: Basic PLC program blocks not migrated, but added to the new version 6.x after the migration.
  Functions and function blocks (other than FC12) are not migrated, because they do not contain any user-specific adaptations and are know-how protected. These FBs and FCs are available as new version in the system library.
- **No longer supported basic PLC program blocks**: If these blocks are contained in your user program, delete them and the associated calls or replace them with current basic program blocks or standard operations.
  - Blocks that are no longer supported with Version ≥ 6.x:
    DB2 in the variant "ExtendAlMsg=False", DB4, DB15, DB17, DB18, DB77
    (Although these DBs are transferred automatically to the SINUMERIK ONE during the PLC migration, they are no longer part of the SINUMERIK basic PLC program ≥ 6.x, and thus no longer have any function.)
    FB4, FB10, FB11, FB29
    FC5, FC22, FC1005, FC1006
    Further information can be found in the appropriate table entry for the associated block in the Appendix (Page 129).

Table 4-1 Migration of blocks of the basic PLC program ≤ V4.9x and associated blocks

Before migration of an existing object	Procedure	After PLC migration of an existing object
Organization blocks (OB)	The organization blocks contain calls of the basic PLC program and calls of your user program. Migrate OBs, such as user program blocks.	Adapted organization blocks without know-how protection
Migratable basic PLC program blocks • All DBs • FC12 [FC12] See also: Migratable blocks of the PLC basic program (Page 129)	During the migration procedure, replace the basic PLC program ≤ V4.9x with basic PLC program 6.x (SINUMERIK ONE), as described in this documentation.	Adapted blocks with new block names
Non-migratable basic PLC program blocks See also: Blocks of the PLC basic program that cannot be migrated (automatically) (Page 134)		Blocks of the new version with new block names
"Diagnostic [FB29]" FB of the basic program ≤ V4.9x originally adapted as STL source: • User-defined adapted STL source • "Diagnostic [FB29]" block generated from the source	Diagnostic [FB29] is no longer a direct part of the basic PLC program ≥ 6.x. If you use (or have adapted) Diagnostic [FB29], migrate it like a user program block. See also: Migration of external sources (Page 58)	Adapted block (STL) without know-how protection

Changing the symbolic names

The symbolic names of the basic PLC program blocks of SINUMERIK ONE (firmware version ≥ 6.x) differ from those of SINUMERIK 840D sl (firmware version ≤ V4.9x).

- To migrate a STEP 7 V5.5 SP4 project with SINUMERIK 840D sl, adapt the names with the supplied symbol table (Page 52).
- To migrate a SINUMERIK 840D sl for a TIA Portal project to a SINUMERIK ONE, you must adapt the names successively.

4.5.3 User alarm concept (DB2)

The ways of creating user alarms differ for the SINUMERIK 840D sl and SINUMERIK ONE CNC systems:

Functionality	SINUMERIK 840D sl	SINUMERIK ONE	Migration
DB2 alarms without alarm extension	supported	not supported	DB2 alarms without alarm extension are no longer supported by SINUMERIK ONE. Consequently, the DB2 block is contained only in the extended variant in the basic PLC program V6.x (SINUMERIK ONE). This means the symbolic identifiers of the interface signals and the offset addresses differ. The Appendix contains a comparison of the addresses in DB2 (Page 144) as well as of the symbolic identifiers for DB2 signals (Page 145).
DB2 alarms with alarm extension	supported	supported	The extended DB2 alarm concept is migrated, provided you observe the general migration procedure in this document.
ALARM_S / ALARM_SQ (SFC17 / SFC18)	supported	not supported	These S7-300 operations of the SIMATIC standard scope belong to the non-migratable operations. Rather, the Program_Alarm operation is available for the S7-1500. Further information for the migration of ALARM_S/ ALARM_SQ to Program_Alarm can be found in the following descriptions: • TIA Portal online help, search term "Migration of Alarm_S" • TIA Portal online help, search term "Notes for non-migratable operations" • FAQ "How in the TIA Portal can alarms be migrated from the S7-300/400 to the S7-1500?" (https://support.industry.siemens.com/cs/document/69817564/)

The procedure and recommended time for the conversion depend on the starting system and the way the user program accesses the DB2 signals:

- If you migrate a STEP 7 V5.5 SP4 project in the TIA Portal and want to work directly with the SINUMERIK ONE, convert the user alarm concept in STEP 7 V5.5 SP4 before migrating the project (Page 27).
- If you have already migrated your SINUMERIK 840D sl PLC project and have worked in the meantime in the TIA Portal, make most of the adaptations in the SINUMERIK ONE after the PLC migration (Page 27).

Handling and functionality of the extended DB2 variant

Differences/commonalities to the unextended DB2 variant

- The user still sets the bits in DB2.
- The parameter assignment via message and alarm is contained in DB5 (rather than DB4).

- The interface signals have different addresses in the DB2 variants, whereby the addresses within the individual DB2 alarm areas have the same structure, each displaced by a specific value.
- The symbolic identifiers of the DB2 signals are different.
- DB2 and DB3 are not created as CPU DB, but must be contained in the project. These blocks are available as global DB in the system library of the basic program.

Note

User-specific definition of user area alarm numbers is no longer supported

To use DB2 alarms with alarm extension, the SINUMERIK 840D sl allows the second digit of the alarm number to be defined for each of the 64 user areas (7dx.xxx). The configuration is made in DB5 starting at offset 72, array DB5.UserDek2No[0..63].

This configuration option is not supported in SINUMERIK ONE. The second digit of the alarm number is always "0" (previous default value).

Further information for any required adaptations to the PLC program and TS files can be found at Removing the user-defined numeric value parameter assignment of the 2nd user alarm decade (Page 51).

Function extensions

- Support for 10 channels, 31 axes, 64 user areas (the number of user areas must be entered in the FC1 parameter "MsgUser").
- Areas for feed stop, read-in disable, etc. are available without messages. The information from this area is stored on the interface in DB21 and DB31 depending on FC10 parameter "ToUserIF" together with the related message bits as group signals. This avoids the previous cumbersome handling of these signals for the unextended variant.
- The alarms/messages for the user area 0 also have 16-bit integer additional values (%Z parameter in the alarm text) in addition to the alarm number. The user must write the 16-bit integer values in DB2 in the array variable AddValUserA0 in parallel to setting an alarm bit. An integer value is available for each bit in the user area 0, see LBP_type_AlarmMsgs (or UDT1002) in the basic program.

Name	Data type	Offset	Description
AddValUserA0	Array[0..63] of Int	DBW182	Additional value for user alarms from user area 0: 700.000...700.063
AddValUserA0[0]	Int	DBW182	Additional value for user alarm 700.000 from user area 0
AddValUserA0[1]	Int	DBW184	Additional value for user alarm 700.001 from user area 0
AddValUserA0[n]	Int	DBW(182+2*n)	Additional value for user alarm 700.000 + n from user area 0
AddValUserA0[63]	Int	DBW308	Additional value for user alarm 700063 from user area 0

(up to V4.8, array variable "AddValUserA0" was called ZInfo0.)

For structuring the extended DB2 variant, PLC data type "LBP_type_AlarmMsgs" (up to V4.8: UDT1002) is required.

See also: Interface DB of the PLC basic program (Page 142)

At the start of DB2 there are bit arrays for signals without alarm generation. This is followed by an array of size 64 integer values for additional info about the user area 0.

Thereafter follow the areas that also trigger alarms/messages (see List Manual). These areas are extended to 10 channels, 31 axes.

4.5.4 Telegram configuration

Because the PLC migration does not include the hardware configuration of the NCU, the telegram configuration of the NCU is not migrated automatically.

- After the PLC migration, the SINUMERIK ONE contains the standard telegram configuration with the standard I/O addresses.
- The migration of the PLC user program, including accesses to the I/O addresses of the telegrams, is part of the PLC migration.
- The migration of peripherals is not part of the PLC migration:
  - NX modules must be added again.
  - Other peripheral modules can be interconnected with the SINUMERIK ONE after the PLC migration.

When for one of the following reasons, you use a telegram configuration that deviates from the standard settings of the SINUMERIK ONE, you must make adaptations:

- User-specific telegram I/O addresses, adapted telegram types and additional added telegrams are not migrated. PLC variables with telegram I/O address accesses are migrated.
- The standard telegram configuration of a SINUMERIK 840D sl V4.7 or higher that was configured with SINUMERIK 840D sl STEP 7 Toolbox V15 or higher differs from that of a SINUMERIK ONE. The previously deployed, and so different telegram I/O addresses, are still deployed in the migrated PLC variables.
- The Safety Integrated mode and the associated telegrams are not configured automatically with the migration. (After migration, reactivate the safety mode in the NCU properties.)
  - If you have used Safety Integrated (SPL) previously, you must create a new safety program based on your existing safety concept or the risk analysis. Whereby, the changed telegram types and I/O addresses must be considered.
  - If you have already deployed Safety Integrated plus (F-PLC), the same telegram types are deployed on the SINUMERIK ONE, although the telegram I/O addresses differ. The previously deployed, and so different telegram I/O addresses, are still deployed in the migrated PLC variables and F-peripheral DB names.

If, for the above-mentioned reasons, the PLC variable accesses to telegram I/O addresses differ from the configured telegram configuration, you must adapt them.

If, in SINAMICS Integrated, you have deployed a telegram configuration with user-specific I/O addresses or already worked in the TIA Portal with a SINUMERIK 840D sl, you must either transfer your user-defined telegram configuration or reset the machine data to the default.

The Appendix (Page 153) provides a tabular overview of the standard telegram configuration, incl. the associated machine data.

Note that the telegram types currently supported by Create MyVirtual Machine are a subset of the configurable telegram types in the TIA Portal.

4.6 Addressing a DB that does not exist in the project

Interface DB of the basic SINUMERIK PLC program

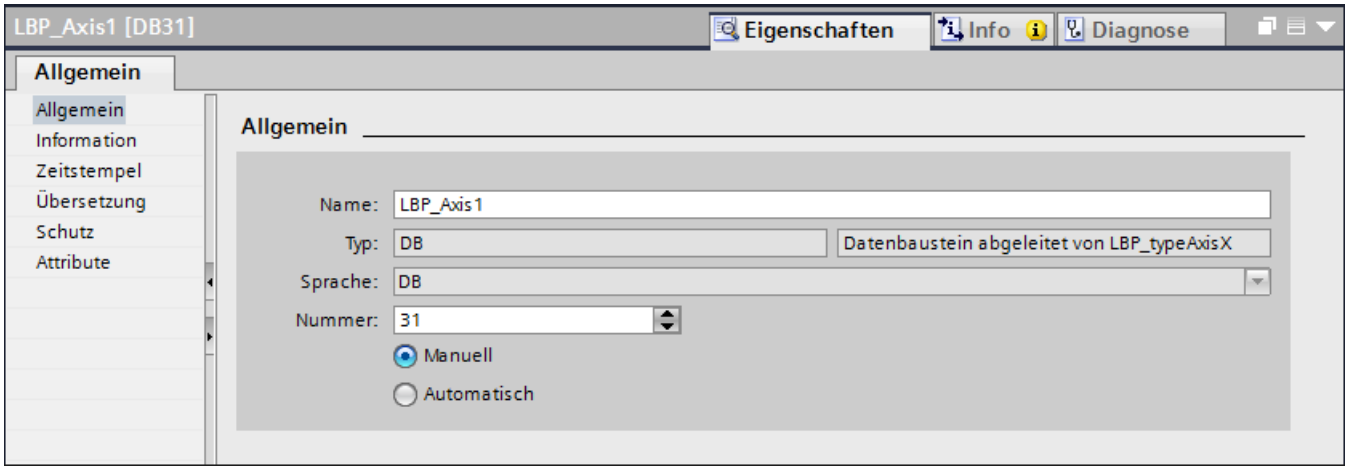
SINUMERIK deploys several interface DBs that exist as so-called CPU-DBs on the CPU.

- In STEP 7 V5.5 SP4, you could address the interface DBs without them existing in the STEP 7 V5.5 SP4 project. The interface DBs for symbolic names and PLC data types (UDT) with the declaration of the data structure are assigned via the symbol table.

gp8x0d (Symbole) -- bp7x0_47

	Status	Symbol	Adresse	Datentyp	Kommentar
36		ALMSG_DB	DB 2	UDT 2	Interface for Alarms & Messages
37		NC	DB 10	UDT 10	Interface NC
38		BAG	DB 11	UDT 11	Interface for BAG
39		MMC	DB 19	UDT 19	Interface MMC-Signals
40		Chan1	DB 21	UDT 21	Interface for Channel 1
41		Axis3	DB 33	UDT 31	Interface Axis 3
42		Axis1	DB 31	UDT 31	Interface Axis 1
43		Axis2	DB 32	UDT 31	Interface Axis 2
44		TMLoadIF	DB 71	UDT 71	Interface for Loading Station (Toolmanag.)
45		TMSpindleIF	DB 72	UDT 72	Interface Spindle for Toolmanagment
46		TMRevIF	DB 73	UDT 73	Interface Revolver (Toolmanagment)
47		TMLoadIF_MT	DB 1071	UDT 1071	Interface for Loading Station (Multitool)
48		TMSpindleIF_MT	DB 1072	UDT 1072	Interface for spindle (Multitool)
49		TMRevIF_MT	DB 1073	UDT 1073	Interface for Revolver (Multitool)
50					

- In the TIA Portal, symbolic names (and the associated PLC data types) are defined directly in the properties of the associated blocks. For this purpose, the associated block must exist in the project.



Consequently, add all required interface DBs for axes, channels, mode groups, NC, HMI and tool management as global DB to the project.

Add the interface DB of the basic program as component of the migration library in STEP 7 V5.5 SP4.

See also: Preparing basic program blocks for migration (Page 54), Interface DB of the PLC basic program (Page 142)

Other DBs not present in the project (e.g. SINUMERIK DB20, user DBs, third-party DBs)

This affects equally all other DBs and DBs from other creators that you address in the user program (symbolic or absolute), without them actually being present in the project. In the TIA Portal, such blocks must exist in the project.

Ideally, create these blocks before the migration in the STEP 7 V5.5 SP4 project.

- If the UDTs or the assignment in the symbol table exist, add the block as "DB of the type" of the associated UDT.
- If you make only absolute access to a block not present in the project, augment it as global DB in the project.

See also: Add global DB or DB based on UDT for further blocks (Page 56)

4.7 Further general information about the migration

Further information about the project migration and PLC migration

General information about the project migration can be found in the TIA Portal online help with the search term "Migrate project". You can also find information about the PLC migration in the Siemens Industry Online Support:

- Migration of complete systems:
  https://support.industry.siemens.com/cs/document/83558085
- Migration of controllers:
  https://support.industry.siemens.com/cs/document/83557459
- Migration of visualization:
  https://support.industry.siemens.com/cs/document/76878921
- Migration of communication:
  https://support.industry.siemens.com/cs/document/83558087
- FAQs on migration:
  https://support.industry.siemens.com/cs/document/67858106

If you require further support, contact Customer Support.

Further information about SINUMERIK in the TIA Portal

The following documents provide specific information for persons converting from STEP 7 V5.5 SP4 to the TIA Portal or the SINUMERIK 840D sl STEP 7 Toolbox V16 Update 2:

- Functionality comparison and tips for persons converting from a different system:
  Getting Started SINUMERIK 840D sl STEP 7 Toolbox V16 Update 2
- Programming recommendations for persons converting from a different system and more detailed information for SINUMERIK users:
  Application example: Programming recommendation for PLC S7-300 for SINUMERIK - preparation for STEP 7 (TIA Portal):
  https://support.industry.siemens.com/cs/document/109478721

Further information about SIMATIC/standard functions in the TIA Portal

Further information about SIMATIC and the TIA Portal can be found in the TIA Portal in the Siemens Industry Online Support:

https://support.industry.siemens.com/cs/document/65601780

There you will find information on our training offers. For experienced users of the classic SIMATIC S7 system who want to migrate efficiently to SIMATIC S7-1500 with the TIA Portal, we recommend "TIA-SYSUP - SIMATIC TIA Portal system migration course for SIMATIC S7-1500".

4.8 Overview of the migration procedure

Note, depending on your starting project, different migration steps are required, but not all migration steps are necessary in all situations. For example, to convert the user alarm concept, different variants that show the easiest method for each associated starting situation are described.

Example migration procedure: SINUMERIK 840D sl in STEP 7 V5.5 SP4 starting system

Chapter	Contents
4	Preparation of the STEP 7 project (Page 45)
5	Migration of the STEP 7 project to a SINUMERIK 840D sl TIA Portal project (Page 65) After this step, check the migration log and the compilation messages. If errors or warnings occur that can be rectified easier in STEP 7 V5.5 SP4, rectify these errors in STEP 7 V5.5 SP4 and repeat the migration.
6	Adaptation of the SINUMERIK 840D sl project in the TIA Portal (Page 69)
7	Migration of the SINUMERIK 840D sl program to a SINUMERIK ONE (Page 77) You have already performed the steps for converting the user alarm concept to the DB2 variant "ExtendAlMsg=TRUE" for this migration procedure in STEP 7 V5.5 SP4 (see Chapter 5, above). After this step, check the migration log and the compilation messages. If errors or warnings occur that can be rectified easier before the PLC migration, rectify these errors in the SINUMERIK 840D sl PLC project and repeat the PLC migration.
8	Make project settings and load project into SINUMERIK ONE/Create MyVirtual Machine (see Create MyVirtual Machine System Manual or SINUMERIK STEP 7 Toolbox online help)
9	Create and import archives in SINUMERIK Operate (see Create MyVirtual Machine System Manual or SINUMERIK Operate online help)
10	Switch over from the system-integrated Safety Integrated to the drive-based Safety Integrated: • Activating Safety Integrated in the TIA Portal (Page 123) • License the software options • Creating a safety program (Page 125) • Perform the Safety commissioning
11	Create and save a machine project

Example migration procedure: SINUMERIK 840D sl starting system in the TIA Portal

Chapter	Contents
6	Adaptation of the SINUMERIK 840D sl project in the TIA Portal (Page 69)
7	Migration of the SINUMERIK 840D sl program to a SINUMERIK ONE (Page 77) After this step, check the migration log and the compilation messages. If errors or warnings occur that can be rectified easier before the PLC migration, rectify these errors in the SINUMERIK 840D sl PLC project and repeat the PLC migration.
8	Make project settings and load project into SINUMERIK ONE/Create MyVirtual Machine (see Create MyVirtual Machine System Manual or SINUMERIK STEP 7 Toolbox online help)
9	Create and import archives in SINUMERIK Operate (see Create MyVirtual Machine System Manual or SINUMERIK Operate online help)

Chapter	Contents
10	Perform the Safety configuration: • Activating Safety Integrated in the TIA Portal (Page 123) • License the software options • Checking the calls of a migrated F-runtime group (Page 126) • Perform the Safety commissioning
11	Create and save a machine project

Preparation of the STEP 7 project

5

5.1 Overview

Note

Validity of the description

These descriptions concern the special considerations for the migration of projects that were created with SINUMERIK 840D sl STEP 7 Toolbox for STEP 7 V5.5 SP4 (or higher). The migration notes and descriptions for STEP 7 (TIA Portal) also apply.

If you want to migrate components that require further option packages, the migration notes of the associated documentation also apply.

A selection of general migration descriptions and notes are available at Further information (Page 42).

Several necessary adaptations to the PLC program must be performed in STEP 7 V5.5 SP4.

Requirement

- The project to be migrated is upgraded to SINUMERIK 840D sl STEP 7 Toolbox 4.5 SP2 (or higher) for STEP 7 V5.5 SP4 (or higher).
- The project does not contain any blocks that are no longer supported with the current SINUMERIK 840D sl basic program versions.
  See also: Migration scope (Page 34)
- The STEP 7 project to be migrated is consistent and can be compiled without error.
- To prepare the project, all option packages, which were used to create the project in STEP 7 V5.5 SP4, are installed and licensed (e.g. the option package for SCL or the F-configuration tool).

Handling overview

Step	Description
1	Check the hardware support (readiness check) Before the migration, use the "Readiness Check Totally Integrated Automation Portal" to check whether the modules of your project are supported: https://support.industry.siemens.com/cs/document/60162195/ If modules are not supported in the TIA Portal, alternative modules will be suggested by this tool.
2	Convert ALMSG [DB2] to the PLC alarm extension (Page 47) If you do not use the extended variant of DB2, begin with the conversion here.
3	Removing the user-defined numeric value parameter assignment of the 2nd user alarm decade (Page 51) If you have adapted the 2nd digit (2nd decade of alarm number 7dx.xxx) user-defined for the DB2 alarms in the user area (alarm numbers 7dx.xxx), you must remove these adaptations.

Step	Description
4	Importing a symbol table with new symbolic names of the basic program blocks (Page 52)
5	Preparing basic program blocks for migration (Page 54)
6	Add global DB or DB based on UDT for further blocks (Page 56)
7	Checking the migration capability of blocks/sources (Page 58)
8	Preparing the conversion from FB4 to LBP_ReqPIService [FB7] (Page 62) If you use FB4, make the adaptations for the conversion to FB7 in this migration step.
9	Checking the user program for required adaptations (Page 63)
10	Convert the starting project to a migration file • If STEP 7 V5.5 SP4 and the TIA Portal are not installed on the same PG/PC, or the starting project is an integrated project, you must convert the starting project to a migration file using the migration tool. See: TIA Portal online help, search term "Migration tool" (valid ≤ TIA Portal V20) • TIA Portal < V20 If you do not use the migration tool, STEP 7 V5.5 SP4 and TIA Portal < V20 must be installed on the same PG/PC, each with all the required option packages. • TIA Portal V20 From version TIA Portal V20, you can no longer directly migrate STEP 7 projects ("*.s7p") directly into the TIA Portal. You must use the appropriate migration tool for the migration.

5.2 Converting ALMSG [DB2] to the PLC alarm extension

Unlike SINUMERIK 840D sl, the SINUMERIK ONE DB2 alarms can be deployed only in the variant "ExtendAlMsg=True" (PLC alarm extension).

We recommend that the conversion to the PLC alarm extension is performed before the migration of the SINUMERIK project in STEP 7 V5.5 SP4.

Note

External source files are not changed by the conversion

If you use external source files (e.g. STL or SCL) from which the blocks are generated for your user program, the DB2 accesses in the generated blocks are converted during this migration step. The program code in the sources, however, is not changed.

If you want to reuse the external source files in the TIA Portal, you must separately adapt the contained DB2 accesses (and import the external sources separately).

See also: Migration of external sources (Page 58)

Note

Comments in the program code are not changed

If your program code uses comments for documentation in which absolute addresses or symbolic identifiers occur, they may need to be adapted separately. Comments are not considered during this migration step.

Note

The procedure described here allows most accesses to DB2 signals in your user program to be identified. However, depending on the project, it is possible that all partially qualified DB2 accesses are not necessarily found via the cross-reference list.

5.2.1 Overview

Requirement

- DB2 is added to the starting project prior to migration based on UDT2.

Overview

Step	Procedure
1	Assign the DB2 offsets the symbols of the extended DB2 variant (Page 48) If you access only absolute addresses of DB2, you can skip this step.
2	Adapt the accesses to DB2 depending on the access type: • Direct access to DB2 with absolute signal addresses (Page 48) • Indirect access to DB2 using user DB and BLKMOVE operation (Page 49) If you access DB2 sometimes via BLKMOVE and sometimes absolutely direct, you must make both adaptation steps. • Direct symbolic accesses to DB2 have already been adapted in Step 1.

See also

Addressing a DB that does not exist in the project (Page 40)

Importing a symbol table with new symbolic names of the basic program blocks (Page 52)

5.2.2 Assigning DB2 offsets the symbols of the extended DB2 variant

The source container of the basic program contains the "udt2_for_Convert.awl" file, which has the following structural element from UDT1002:

- ChanA as array of 1 ... 8
- AxisA as array of 1 ... 18
- UserA as array of 0 ... 63

This STL file can be used to create a UDT that assigns the offsets of the DB2 variant "ExtendAlMsg=False" the symbolic names of the DB2 variant "ExtendAlMsg=True".

Basic procedure

To assign DB2 offsets of the variant "ExtendAlMsg=False" the symbols of the variant "ExtendAlMsg=True", proceed as follows:

1. Compile the "udt2_for_Convert.awl" file.
   This creates a UDT2 that contains an assignment of the DB2 offsets to the symbols of the new DB2 variant.
2. Open the symbol table and assign DB2 the newly-created UDT2.

5.2.3 Conversion for direct absolute access to ALMSG [DB2]

Requirement

- DB2 based on UDT2 is added to the project.

Basic procedure

To convert the access to absolute signals from DB2 in STEP 7 V5.5 SP4, proceed as follows:

1. To find the affected blocks in your user program, use the cross-reference list ("Options > Reference data > Displays" menu command).
2. Open the affected program locations successively and convert the offset addresses of the associated DB2 signals. The new offset address results from the sum of the previous address and the "offset".

Example 1

```
OPN DB2
...
CLR
S %DBX<Bit in DB2>
```

Example 2

```
OPEN DB2
...
L 0
T DBB<Byte in DB2>
```

Note

Finding DB2 accesses in the user program

Not all DB2 accesses are found via the reference data. Accesses via BLK_DB or pointer are not detected.

A comparison of the associated offset addresses and the address offset can be found in the appropriate table (Page 144).

5.2.4 Conversion for indirect access via BLKMOV

The following adaptations are necessary when you do not directly access ALMSG [DB2], but instead use BLKMOV to copy memory areas of your own data blocks to ALMSG [DB2].

5.2.4.1 Checking and adapting copied memory areas

The offset addresses of both DB2 variants have the same structure within the individual DB2 areas[1], each offset by a specific value. This offset is, however, different for each DB2 area.

Check whether you use BLKMOV copy operations that copy a memory area larger than a DB2 area. If you copy such memory areas, you must divide the copy operation into several operations.

[1]See: "Area" column in the Comparison of offsets in DB2 variants (Page 144) table

Basic procedure

To divide the BLKMOV operations, proceed as follows:

1. To find the affected program locations in your user program, use the cross-reference list ("Options > Reference data > Displays" menu command).
2. Open those blocks with BLKMOV copy operations that copy the data of multiple DB2 areas concurrently (or copy a memory area larger than a DB2 area).
3. Divide the associated BLKMOV operations into several operations so that each copies the data of just one area.
   The individual DB2/alarm number areas can be found at Comparison of the addresses in DB2 (Page 144).

5.2.4.2 Adapting the copy target for BLKMOV

The offset addresses of both DB2 variants have the same structure within the individual DB2 areas[1], each offset by a specific value. This offset is, however, different for each DB2 area.

Consequently, you must consider the new offset address appropriate for the associated DB2 area and adapt it appropriately.

[1]See: "Area" column in the Comparison of offsets in DB2 variants (Page 144) table

Basic procedure

To adapt the target memory addresses for BLKMOV operations by copying the data to DB2, proceed as follows:

1. To find the affected program locations in your user program, use the cross-reference list ("Options > Reference data > Displays" menu command).
2. Open those blocks that copy data via BLKMOV to DB2.
3. Change each offset address of the BLKMOV target memory area. The new offset address results from the sum of the previous address and the "offset".
   A comparison of the associated offset addresses and the address offset can be found in the appropriate table (Page 144).

5.3 Removing the user-defined numeric value parameter assignment of the 2nd user alarm decade

If you have adapted the 2nd digit (2nd decade of alarm number 7dx.xxx) user-defined in the user area (alarm numbers 7dx.xxx), you must remove these adaptations. SINUMERIK ONE does not support values that differ from the standard "0".

After the PLC migration to SINUMERIK ONE, any existing values for the "2nd decade" in LBP_ParamAlarmMsgs [DB5] have no effect. The existing DB5 array "UserDek2No [.]" in the SINUMERIK 840D sl basic PLC program has been renamed as "ByteArray72 [.]".

Basic procedure

To remove the user-defined numeric value parameter assignment of the 2nd user alarm decade, proceed as follows:

- In LBP_ParamAlarmMsgs [DB5], set all values in LBP_ParamAlarmMsgs.ByteArray72[.] to 0. Values that differ from the standard value 0 have no effect.
- If the PLC program writes these values with program operations (such as in OB100) in the LBP_ParamAlarmMsgs [DB5], these operations must be removed.
- In the TS files, change (with SINUMERIK Operate) the definition of the alarm texts for alarms 7dx.xxx so that only alarm numbers 70x.xxx are used. To do this, search the TS files for entries with the element <source> and change the associated alarm number.
  These changes must be made before you create the SINUMERIK 840D sl archive for the archive migration.

Further information

Further information about specifying alarm texts can be found in the *SINUMERIK Operate (IM9)* Commissioning Manual at "Configuring alarms".

5.4 Importing a symbol table with new symbolic names of the basic program blocks

The symbolic names of the basic PLC program blocks of SINUMERIK ONE (firmware version 6.x) differ from those of SINUMERIK 840D sl (firmware version ≤ 4.9x).

As appropriate for the currently used ALMSG[DB2] layout, use one of the following supplied symbol tables to adapt the block names automatically:

DB2 version	UDT	Symbol table
DB2 without alarm extension	UDT2	LBP_symbols_for_classic_UDT2.asc
DB2 with alarm extension	UDT1002	LBP_symbols_for_classic_UDT1002.asc

Requirement

- The required symbol file is available on the PG/PC or the product DVD of the SINUMERIK STEP 7 Toolbox is inserted.
  This file can be found in the "Support\Migration" directory on the product DVD of the SINUMERIK STEP 7 Toolbox.
- The project to be migrated is open in STEP 7 V5.5 SP4.
- Block number ranges of the SINUMERIK basic program in the project are not assigned blocks from other creators, e.g. user blocks, or third-party blocks or blocks from other Siemens products (e.g. DB_HMI [DB59] from Transline).
  The block number ranges of the SINUMERIK basic program are shown in the tables in the Appendix (Page 129).

Note

Procedure for the assignment of the SINUMERIK number range by blocks from other creators

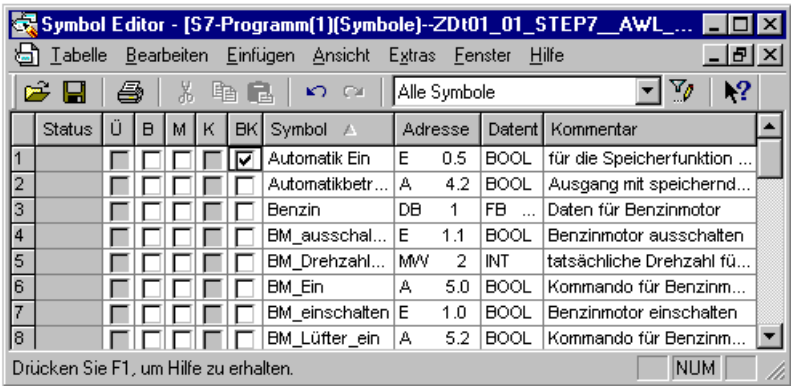
When you import the migration symbol table as described below, all blocks in the SINUMERIK number range are assigned the new symbolic names of basic program V6.x. The import operation cannot check whether the SINUMERIK number range is used for other blocks.

If you use the SINUMERIK number range for other blocks, before importing, open the symbol file (LBP_symbols_for_classic_UDT2.asc or LBP_symbols_for_classic_UDT1002.asc) in an external editor and delete those block entries assigned in your project by blocks from other creators. Save the file with a new name and use your modified file rather than the original.

Procedure

To update the names of the basic PLC program before migration, proceed as follows.

1. In the STEP 7 V5.5 SP4 project window, double-click the symbol table.
   The symbol editor opens.



2. Select the "Table > Import..." menu command.
3. Switch in the "Import" dialog to the desired file ("LBP_symbols_for_classic_UDT2.asc" or "LBP_symbols_for_classic_UDT1002.asc" or a customized symbol file) in the appropriate directory and confirm with "Open".
   The symbol table is imported:
   - Blocks of the SINUMERIK basic PLC program without symbolic names are assigned the new block name.
   - Any previously defined symbols in the block number range of the basic program are overwritten with the new symbols.
   - The message "Import result" is displayed and a new log file is created.
4. Save the symbol table with the "Table > Save" menu command.

More information

Detailed information about symbol tables can be found in the *Programming with STEP 7* manual or in the STEP 7 V5.5 SP4 online help.

5.5 Preparing basic program blocks for migration

5.5.1 Dearchiving and opening the basic program migration library

Requirement

- The "840Dsl_MigrationDummyLib.zip" file is available on the PG/PC or the product DVD of the SINUMERIK STEP 7 Toolbox is inserted.
  This file can be found in the "Support\Migration" directory on the product DVD.
- The project to be migrated is opened in STEP 7 V5.5 SP4 or higher.

Procedure

To open the basic program migration library in STEP 7 V5.5 SP4, proceed as follows:

1. Select the "Dearchive" command in the "File" menu.
2. Switch to the "Support\Migration" directory on the product DVD, select the "840Dsl_MigrationDummyLib.zip" file, and confirm with "Open".
3. Select the "s7libs" folder as target directory in the STEP 7 V5.5 SP4 installation directory.
4. Select the "Open" command in the "File" menu, select the "840Dsl_MigrationDummyLib" library in the "Libraries" tab, and confirm with "OK".

5.5.2 Replacing basic program blocks with migration blocks and dummy blocks

Requirement

- The project to be migrated is open in STEP 7 V5.5 SP4.
- The "840Dsl_MigrationDummyLib" library is open (Page 54).
- Block number ranges of the SINUMERIK basic program in the project are not assigned blocks from other creators or you have checked which blocks from other creators are located in the SINUMERIK number range (Page 129).

Procedure

To replace the basic program blocks in your project with migration blocks and dummy blocks, proceed as follows.

1. Check which migration blocks and dummy blocks you require from the library.
   Select the required migration blocks and dummy blocks, and copy them to the clipboard.

Block	Purpose/procedure
Data blocks	These DBs are required in the TIA Portal project, because addressed interface DBs must exist in the project. See also: Addressing a DB that does not exist in the project (Page 40) • Before copying, check that these number ranges of the basic program have not been used for user blocks or third-party blocks. These blocks may be used only to overwrite basic program blocks.
DB21...DB30	Select the actually used axis/channel DB.
DB31...DB61	
Function blocks / functions	These FBs/FCs do not contain the actual program code, but rather the associated interfaces and inputs/outputs. This means they are retained for the migration, after which they can be replaced with complete blocks of basic PLC program V6.x. Overwrite existing basic program FBs/FCs in your project with the associated basic program FBs/FCs.
FB4	To simplify the conversion, FB4 from this migration library contains the extended interface of FB7. If you already use FB7, you do not require this FB4. See also: Preparing the conversion from FB4 to LBP_ReqPIService [FB7] (Page 62)

   (If the basic program block number range is not assigned blocks from other creators, you can select and copy all blocks.)

2. Insert the copied blocks from the clipboard in the "Blocks" folder in your project. Whereby, overwrite any existing basic program blocks.

Result

The deployed basic program blocks have been replaced with blocks from the migration library:

- Deployed interface DBs have been added to the project as global DBs, as required in the TIA Portal.
- Deployed know-how protected basic program blocks have been replaced with dummy blocks that can be migrated.
- If you use FB4, it has been replaced with a variant that simplifies conversion to the extended FB7.

5.6 Add global DB or DB based on UDT for further blocks

In the TIA Portal, addressed or deployed DBs must exist in the project.

See also: Addressing a DB that does not exist in the project (Page 40)

For example, if you access DB20, add this as global DB in the project.

Note

If you access DB2 in the extended variant ("ExtendAlMsg = True"), but this DB does not exist in your project, create it based on UDT1002.

If you access DB2 in the small variant ("ExtendAlMsg = False"), you have created it based on UDT2 already for the conversion to the PLC alarm extension (see "Converting ALMSG [DB2] to the PLC alarm extension (Page 47)").

Procedure

To create an addressed, but non-existent, data block in the project **based on a UDT**, proceed as follows:

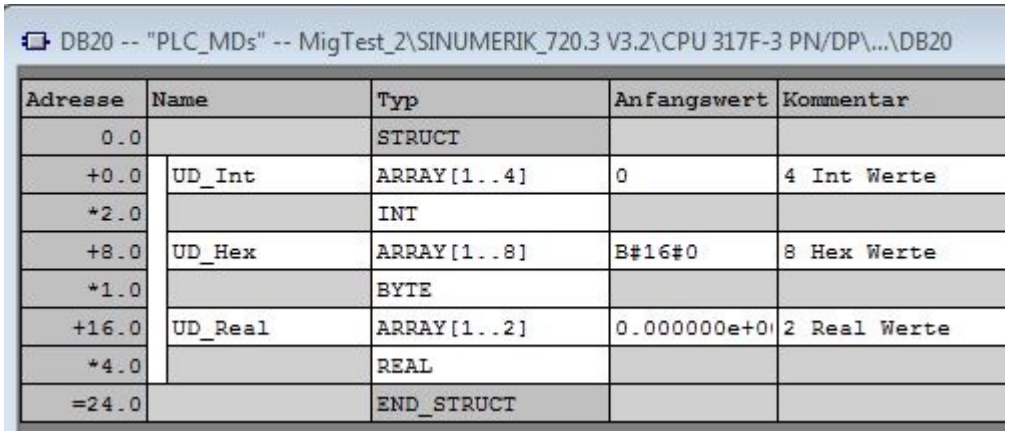
1. In the STEP 7 V5.5 SP4 project window, right-click the "Blocks" folder and select the "Add new object > Data block" command.
   The "Properties - Data block" dialog opens.
2. In the "Name" and "Type" fields, enter the block address, then select "DB of type" and the associated UDT.
3. Enter the symbolic name and confirm with "OK".

To create an addressed, but non-existent, data block **as global DB** in the project, proceed as follows:

1. In the STEP 7 V5.5 SP4 project window, right-click the "Blocks" folder and select the "Add new object > Data block" command.
   The "Properties - Data block" dialog opens.
2. In the "Name" and "Type" fields, enter the block address, then select "Global DB".
3. Enter the symbolic name and confirm with "OK".

DB20 example

To prepare DB20 for use in the SINUMERIK ONE environment, the data arrays must be created in accordance with the number of PLC machine data items in DB20 to be transferred:



DB20 -- "PLC_MDs" -- MigTest_2\SINUMERIK_720.3 V3.2\CPU 317F-3 PN/DP\...\DB20

Adresse	Name	Typ	Anfangswert	Kommentar
0.0		STRUCT		
+0.0	UD_Int	ARRAY[1..4]	0	4 Int Werte
*2.0		INT		
+8.0	UD_Hex	ARRAY[1..8]	B#16#0	8 Hex Werte
*1.0		BYTE		
+16.0	UD_Real	ARRAY[1..2]	0.000000e+0	2 Real Werte
*4.0		REAL		
=24.0		END_STRUCT		

PLC machine data

For the SINUMERIK 840D sl, the PLC machine data was typically stored in the DB20 during run-up of the PLC. With SINUMERIK ONE, the PLC machine data is supplied at the parameters of "LBP_ConfigBP [FC1]". As an alternative to arrays, structures or PLC data types can be used.

A description of the PLC machine data can be found in the SINUMERIK ONE PLC Function Manual using the keyword "PLC machine data" in the section "LBP_ConfigBP [FC1]".

See also

Replacing the call of LBP_ConfigBP [FB1] in OB Startup [OB100] with LBP_ConfigBP [FC1] (Page 109)

5.7 Checking the migration capability of blocks/sources

5.7.1 Migration of external sources

If the STEP 7 V5.5 SP4 project uses external sources, the sources are not migrated, but rather the blocks generated from these sources.

Note

Using external sources in the TIA Portal

If you want the STL/SCL sources in the TIA Portal still to be treated as external sources, and to be opened and edited with an external editor, they must be imported explicitly into the TIA Portal.

Further information about working with external sources can be found in the TIA Portal online help, search term "External source".

Blocks generated from external sources can be edited after the migration, provided they were not know-how protected before the migration (Page 58).

5.7.2 Checking know-how protected blocks

In STEP 7 V5.5 SP4, know-how protected blocks cannot be migrated to a SINUMERIK ONE.

- The migrated blocks with STEP 7 V5.5 SP4 know-how protection can run in the TIA Portal with a SINUMERIK 840D sl.
- The blocks can no longer be edited, because the program code is not migrated automatically.

Consequently, use the following tables to check how the know-how protection of the associated blocks can be removed.

Overview

The procedure for migrating a know-how protected block is different depending on the owner of a know-how protected block and the type of the know-how protection.

Table 5-1 Migration of user-written know-how protected blocks of the user program

Before migration of existing objects	Procedure	After PLC migration of an existing object
Know-how protected block originally programmed as STL source: • STL source with keyword "KNOW_HOW_PROTECT" (possibly removed from the project) • Generated know-how protected block (STL)	If the original source was programmed in STL, if necessary, add it again to the project, remove the keyword "KNOW_HOW_PROTECT" and generate the block again (Page 60).	Adapted block (STL) without associated source and without know-how protection
Know-how protected block originally programmed as SCL source: • SCL source (possibly removed from the project) • STL source created from SCL source with keyword "KNOW_HOW_PROTECT" (possibly removed from the project) • Generated know-how protected block (STL)	If the original source was programmed in SCL and then protected with keyword "KNOW_HOW_PROTECT" in STL, add the original SCL source to the project and generate the block again.	Adapted block (SCL) without associated source and without know-how protection
FB/FC with improved know-how protection "S7-Block Privacy" (password-based)	Remove the improved STEP 7 V5.5 SP4 know-how protection "S7-Block Privacy" before migration to STEP 7 V5.5 SP4 as described in the following FAQ: SIOS, Entry ID: 45632073 (https://support.industry.siemens.com/cs/document/45632073/)	Adapted FB/FC without know-how protection

After migration, you can reactivate the know-how protection of your blocks while using the newer, password-based variant of the know-how protection in the TIA Portal.

Table 5-2 Migration of know-how protected blocks from other creators (third-party manufacturer or blocks from other Siemens option packages or products)

Before migration of an existing object	Procedure	After PLC migration of an existing object
Block with know-how protection of any type	Obtain the appropriate new blocks that can run on SINUMERIK ONE from the creator of the blocks. Contact the creator of the blocks.	New, operational block with know-how protection
	If these blocks have been announced by the creator, but are not yet available at the specified time, you can use a workaround (Page 75) temporarily. This workaround is handled in the TIA Portal, i.e. after project migration and before the PLC migration. In this way, you can already migrate the other components and add the missing blocks later. The functionality of the missing blocks, however, is available only after adding the complete blocks.	Dummy block without function and without know-how protection that contains only the block name and parameters or inputs and outputs

Further information

- A table with information about the migration of basic PLC program blocks (Page 35) can be found at "Migration scope".
- Information about the migration of user-written know-how protected blocks of the user program can be found in the TIA Portal online help, search terms "Migration of LAD/FBD/STL programs", "Protect blocks"
- Information about the migration of SIMATIC blocks and operations can be found in the TIA Portal online help, Chapter "PLC migration".

See also

PLC basic program (Page 34)

5.7.3 Revoking know-how protection of type "KNOW_HOW_PROTECT"

Requirement

- The external source of the know-how protected block exists in the project.
  If you do not have the source of a know-how protected block, you cannot deactivate the know-how protection and cannot migrate the block.

Procedure

To remove the know-how protection of a block based on an external source, proceed as follows:

1. In the "Sources" folder of your S7 program, open the source of the know-how protected block.
2. Delete the function "KNOW_HOW_PROTECT" in the source code.
3. Select the "Save" command in the "File" menu.
4. Select the "Compile" command in the "File" menu.

Result

A block without know-how protection was created from the source that can be migrated.

After migration, you can reactivate the know-how protection, while using the newer, password-based variant of the know-how protection.

More information

Information about know-how protected blocks of the user program can be found in the TIA Portal online help, search terms "Migration of LAD/FBD/STL programs", "Protect blocks"

5.8 Preparing the conversion from FB4 to LBP_ReqPIService [FB7]

When, as part of the migration you convert from FB4 to FB7, perform a compilation in this migration step.

If you have already deployed PI_SERV2 [FB7] before the migration, skip this migration step.

Requirement

- PI_SERV [FB4] is replaced (Page 54) with LBP_ReqPIService_MigFB4 [FB4] from the migration library.
- The symbol table is imported. (Page 52)

Procedure

To convert the parameter transfer of the FB4 calls to the extended FB7 interface, proceed as follows:

1. In the STEP 7 V5.5 SP4 project window, right-click the "Blocks" folder and select the "Check block consistency" command.
   The "Check block consistency" editor opens.
2. Select the "Compile all" command in the "Program" menu.

Result

The compilation transferred the parameter transfer for FB4 calls to the extended interface for FB7 contained in LBP_ReqPIService_MigFB4 [FB4]. In a later migration step (after the project migration and the PLC migration), complete the conversion to FB7 (Page 90).

5.9 Checking the user program for required adaptations

STEP 7 (TIA Portal) contains not only the new user interface and operation, but also several functional changes and innovations for handling the PLC program. For example, in the TIA Portal, each block has a number and a name, and the symbolic addressing takes precedence.

During the migration of the user program, a symbol and a data type are assigned automatically to each deployed absolute address (e.g. flags, I/O addresses). In addition, stricter rules for checking data type compatibility are deployed in the TIA Portal.

In particular, the following calls or procedures in the user program can cause problems with the migration:

- Implicit type conversions of absolute addresses that differ from the declared data type
- Saving intermediate results with absolute addresses or global flags without declared data type
- Saving different data types in the same address area
- Writing input parameters or reading output parameters
- Absolute addressing of the local data stack
- Conditional opening of a DB with subsequent partially qualified addressing (see Example)

Consequently, adapt your user program before you migrate your project to the TIA Portal. For more detailed information, see the following application example:

- Programming recommendation for PLC S7-300 for SINUMERIK - preparation for STEP 7 (TIA Portal) (https://support.industry.siemens.com/cs/document/109478721/)

The following product support-pages also provide programming recommendations for migrating:

- Programming recommendations for S7-1200/S7-1500 (https://support.industry.siemens.com/cs/document/67582299/)
- Further programming recommendations for S7-1500 (https://support.industry.siemens.com/cs/document/67858106)

Changes to the user program required by innovations of basic PLC program 6.x are covered by the migration steps in this documentation.

Using the migration log and compilation messages to identify any migration problems in advance

As preliminary test, perform the project migration and PLC migration to identify early any required changes to your user program.

Rectify any problems from the messages on the starting project in STEP 7 V5.5 SP4 or in the TIA Portal before the PLC migration.

See: Migration log and compilation messages (Page 150)

Migration of the STEP 7 project to a SINUMERIK 840D sl TIA Portal project

6

Requirement

- The project was converted with the migration tool to format "*.amxx" [xx version of the migration tool] *or* STEP 7 V5.5 SP4 (or newer) and the TIA Portal are installed on the PG/PC (each with all deployed option packages).

  Note

  Migration, STEP 7 project and TIA Portal version

  - With TIA Portal < V20, you can select whether you wish to use the integrated migration of STEP 7 projects (*.s7p) or work with the migration tool.
  - With TIA Portal V20, you can carry out the migration using the migration tool. You can then migrate the migration file into the TIA Portal. You must first install the migration tool (Preparations of the starting project (Page 25)).

- The project to be migrated is upgraded to SINUMERIK 840D sl Toolbox as of 4.5 SP2 for STEP 7 as of V5.5 SP4.
- The project to be migrated contains only those modules supported in the TIA Portal.
  Use the Readiness Check Tool to check whether the modules used are supported. Alternative modules will be displayed if modules are not supported in the TIA Portal.
- The STEP 7 project to be migrated is consistent and can be compiled without error.
  If your project cannot be executed, you must correct it in STEP 7 V5.5 SP4, before you migrate it. You can check the consistency with SIMATIC Manager and restore by compiling the blocks.
- The STEP 7 project to be migrated does not have access protection.

Observe any additional notes for the requirements in the help for the associated installed products.

Note

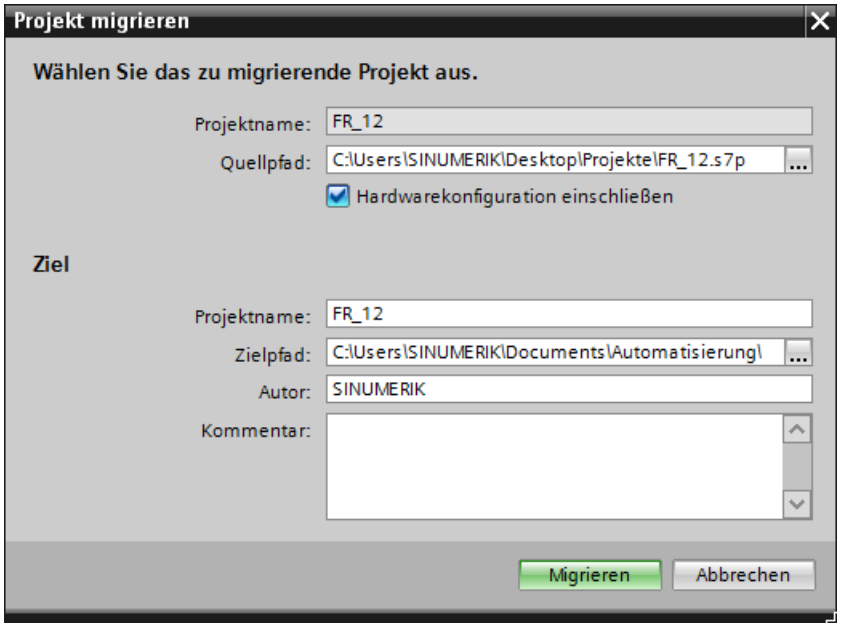
System hibernation during the migration

While a migration is running, the system should not be changed to the standby or hibernate mode. Otherwise the migration will be aborted.

Procedure

To migrate a STEP 7 V5.5 SP4 project to the TIA Portal, proceed as follows:

1. Select the "Migrate project" command in the "Project" menu.
   The "Migrate project" dialog opens.
2. Specify the path and the file name for the project to be migrated in the "Source path" field.
   Select either a project in migration format "*.amxx" or in the STEP 7 V5.5 SP4 format "*.s7p" (only for TIA Portal < V20).



3. Make any necessary additional settings:

Option	Remark
Include hardware configuration	Activate this checkbox so that the modules, incl. configuration, are migrated. Otherwise, only the PLC program is migrated. If you have selected a migration file that was created with the migration tool, the checkbox cannot be activated. In this case, you must specify whether you want to include the hardware configuration in the migration before the conversion with the migration tool .
Project name	Name of the TIA Portal project. It is also the same name as the file name without file extension.
Target path	The path in which the new project is created. For example, projects newly-created with the TIA Portal are stored at the following location by default: C:\Users\<user rname>\Documents\Automatisierung\
Author	The author responsible for the project. This entry can be viewed in the project properties and changed subsequently.
Comment	Optional comment for the project. This entry can be viewed in the project properties and changed subsequently.

4. Click "Migrate".

Result

The starting project is converted and a message displayed after the conversion is complete. The newly-created project is then opened in the project view, and the migration log is opened in the TIA Portal.

Check the migration log (Page 150) to assess whether you can continue working with the migrated project or whether you must rectify certain problems in STEP 7 V5.5 SP4 and migrate the project again.

Even if the migration failed, a project directory is created and a migration log in the form of an XML file is generated in this directory. The completion message that appears after the migration contains a link to this XML file. Click the link to open the XML file. Alternatively, you can find the XML file in the project directory at "\Logs".

Adaptation of the SINUMERIK 840D sl project in the TIA Portal

7

Overview

Depending on your starting system and project, you may need to perform further steps prior to the PLC migration to a SINUMERIK ONE.

Step	Procedure
1	Renaming basic program blocks (Page 70) To migrate a SINUMERIK 840D sl to a SINUMERIK ONE from a TIA Portal project, you must change the symbols. If instead, to migrate from a STEP 7 V5.5 SP4 project, the symbols have already been adapted in a previous step.
2	Adding dummy blocks to know-how protected basic program blocks (Page 73) To migrate a SINUMERIK 840D sl to a SINUMERIK ONE from a TIA Portal project, you must add migration-capable dummy blocks here. This retains the accesses to interfaces and inputs/outputs of the basic PLC program blocks after the migration.
3	Converting a know-how protected block to a dummy block without function (Page 75) If your project contains know-how protected blocks from other creators that are currently not yet available for SINUMERIK ONE, you can use this workaround temporarily. This allows converted blocks to be transferred during the PLC migration without causing any error messages, but do not have any function, and so must be replaced subsequently with functional blocks.
4	Removing the Safety Integrated (SPL) program (Page 76) Safety Integrated (SPL) is not supported by SINUMERIK ONE. If you have deployed this Safety operating mode, you must adapt the PLC program before the migration.

7.1 Renaming basic program blocks

Changing the symbolic names

The symbolic names of the basic PLC program blocks of SINUMERIK ONE (firmware version 6.x) differ from those of SINUMERIK 840D sl (firmware version ≤ 4.9x).

- If you migrate with SINUMERIK 840D sl from a STEP 7 V5.5 SP4 project, the symbols have been adapted automatically with the supplied symbol list (Page 52).
- To migrate a SINUMERIK 840D sl to a SINUMERIK ONE from a TIA Portal project, you must change the symbols.

By adapting the symbolic names of the basic PLC program blocks, for example, the calls of the basic program blocks in the user program are changed so they match the future symbols.

Requirement

- The STEP 7 V5.5 SP4 project has been migrated to the TIA Portal (without adapting the symbolic block names using the symbol list)

Procedure

To change the symbolic names of the basic PLC program blocks, proceed as follows:

1. You have several options for displaying the basic program blocks:
   - In the project navigation, open the Program Blocks folder below the PLC (e.g. "CNC_1 > PLC_1 > Program Blocks").
   - Select the Program Blocks folder below the PLC, click the "Maximizes/minimizes the overview" symbol and switch to the "Details" tab.

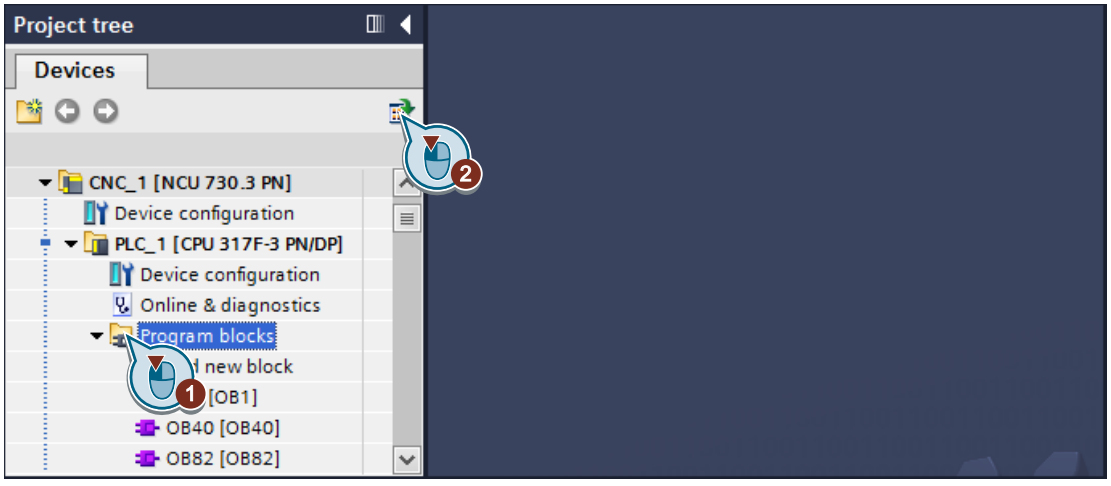


Figure 7-1 Project navigation

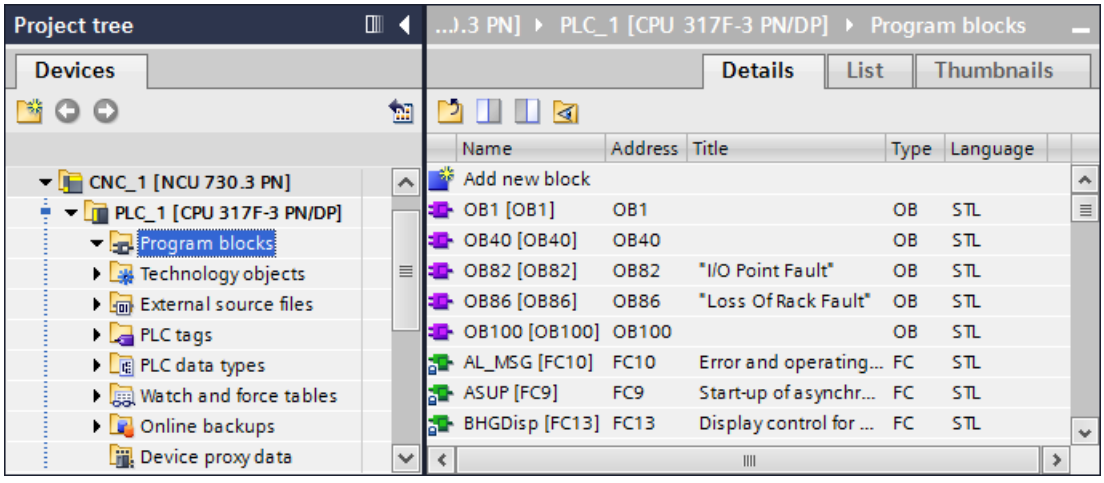


Figure 7-2 Detailed view of the basic program blocks

The blocks can be sorted in the maximized overview, e.g. according to address, author or family.
If the blocks are structured into groups or subfolders, the "Display lower-level elements" button is enabled.

2. Select the associated block names successively and change them with F2 or the "Rename" context menu command.
   The "Comparison of the old and the new symbolics of the basic program blocks (Page 142)" table provides a comparison of the symbolic names sorted according to the absolute address.

Result

The symbolic block names have been changed, whereby the symbolic calls of the blocks in the PLC program were updated automatically.

Result and effects for the conversion of a DB2 user concept of a TIA Portal project

If the DB2 alarm concept in the TIA Portal is converted, the PLC program calls are changed from "ALMSG_DB" to "LBP_AlarmMsgs", but not the symbolic signal identifiers or addresses. They must be adapted after PLC migration.

7.2 Adding dummy blocks to know-how protected basic program blocks

A dummy library with PLC basic program blocks in a non-know-how protected variant is contained on the product DVD of the SINUMERIK STEP 7 Toolbox. The blocks of this dummy library do not contain the actual program code, but rather the associated interfaces and inputs/outputs. This means they are retained for the migration, after which they can be replaced with complete blocks of basic PLC program V6.x.

Requirement

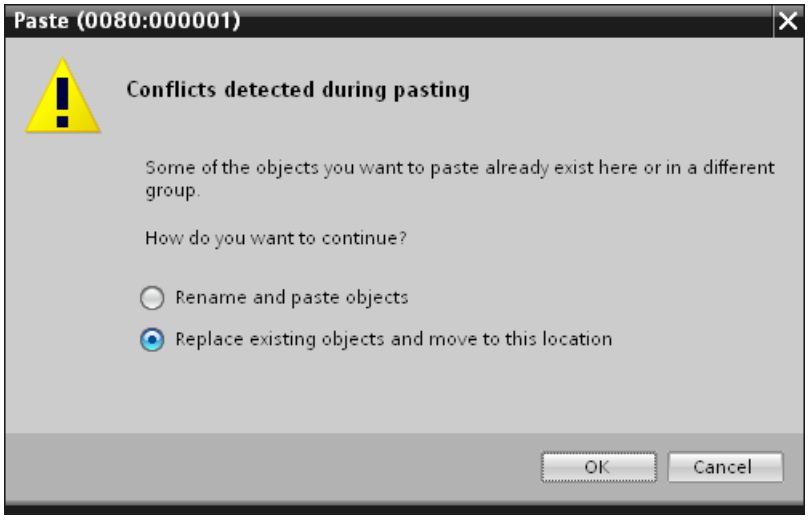
- The basic program blocks are renamed (Page 70).
  If the dummy blocks are copied before the basic program blocks have been renamed, the blocks are not replaced, but rather duplicated. In this case, the duplicate blocks must be deleted subsequently.
- The product DVD is inserted (or the "Support\Migration\SINUMERIK 840D sl Migration Dummy Library.zalXX" file is available elsewhere).

Procedure

To copy the library blocks to your project, proceed as follows:

1. In the "Options" menu, select the "Global libraries > Dearchive library" command.
2. Switch to the "Support\Migration" folder on the product DVD, select the "SINUMERIK 840D sl Migration Dummy Library.zalXX" file, and confirm with "Open".
3. If necessary, adapt the storage location in the "Search for folder" dialog and confirm with "OK".
   As default, the new global libraries are stored in the following directory:
   C:\Users\<user name>\Documents\Automatisierung\<library name>\<library name>.zalXX
4. Confirm the "Upgrade library" message with "OK".
5. Switch to the "Libraries" task card and open the "SINUMERIK 840D sl Migration Dummy Library_VXX" library.

6. Drag-and-drop the "Copy Templates > Single Blocks" folder to the "Program Blocks" folder (e.g. at "CNC_1 > PLC_1 > Program Blocks").
   The blocks are copied to your project. A check is made for duplicate block names, in which case the "Conflicts during copying" dialog is displayed.



7. Select the "Replace existing objects and move them to this location" option and confirm with "OK".
8. Right-click the "Program Blocks" folder and select the "Software (compile all blocks)" command.
   The PLC program is compiled and a check is made for duplicate block addresses. Messages are issued if not all basic program blocks have been renamed.

7.3 Converting a know-how protected block to a dummy block without function

Know-how protected blocks from other creators cannot be transferred with PLC migration, but rather the appropriate new blocks that can run on SINUMERIK ONE must be obtained from the creator.

If these blocks have been announced by the creator but are not yet available at the specified time, you can use the following workaround temporarily.

In this way, you can already migrate the other components and add the missing blocks later. The functionality of the missing blocks, however, is available only after adding the complete blocks.

Procedure

To convert a know-how protected block with PLC migration to a dummy block without function, proceed as follows:

1. In the "Program Blocks" folder, right-click the know-how protected block from which a dummy block is to be created, then select the "Copy as text" command.
   The non-know-how protected part of the block (block name and parameters, and inputs/outputs) is copied as program code to the clipboard.
2. With an external text editor (e.g. Notepad), add the content of the clipboard to the new file and save it as STL file. (The file name does not need to match the block name.)
3. In the "External Sources" folder, double-click "Add new external file", select the newly-created STL file and Confirm with "Open".
4. Right-click the newly added external source, and select the "Generate blocks from source" command.

Result

The know-how protected block in the "Program Blocks" folder is overwritten with a non-know-how protected dummy block.

This block is now transferred during the PLC migration without causing any error messages, but does not have any function. Replace this dummy block with the correct or functional block once it is available from the associated manufacturer in a compatible version.

Make a note in your project documentation which blocks are dummy blocks and which still need to be augmented as functional blocks.

7.4 Removing the Safety Integrated (SPL) program

Safety Integrated (SPL) is no longer supported by SINUMERIK ONE. If you have deployed this Safety operating mode, you must adapt the PLC program before the migration.

Basic procedure

Safety Integrated (SPL) blocks cannot be migrated to a SINUMERIK ONE.

- SI_Relais [FB10]
- SI_BrakeTest [FB11]
- SPL [DB18]

  Note

  Deleting the block causes compilation errors in the TIA Portal

  Delete DB18 only after the PLC migration to SINUMERIK ONE (see Deleting blocks after the PLC migration (Page 82)).

- SI Pulse Teststop SL [FC264]
- SI External Stop SL [FC265]

If you have deployed this Safety operating mode, you must remove the associated blocks as well as all accesses to functions and function blocks, and to signals for data blocks from your PLC program.

Migration of the SINUMERIK 840D sl program to a SINUMERIK ONE

8

8.1 Overview

Step	Procedure
1	Migration of PLC program into a SINUMERIK ONE (Page 78)
2	Checking the migration log (Page 80)
3	Interconnect peripherals with SINUMERIK ONE (Page 83)
4	Checking the compilation messages (Page 85)
5	Transferring a telegram configuration (Page 86)
6	Preparing the conversion from FB4 to LBP_ReqPIService [FB7] (Page 90) If you have deployed FB4 before the project migration and made adaptation steps there, complete them with this step.
7	Add data types of the basic PLC program blocks
8	Add dummy blocks to know-how protected basic program blocks (Page 97)
9	Convert DB2 to the PLC alarm extension (Page 103) If you deploy the "ExtendAlMsg=False" DB2 variant, and migrate a SINUMERIK 840D sl project from a previously migrated TIA Portal, convert to the extended DB2 alarms here.
10	Converting accesses to the ZInfo0 DB2 array variable (Page 107) If you have already deployed DB2 with alarm extension on the 840D sl, you may need to convert the calls of the ZInfo0 array variable.
11	Transfer user-defined alarm/message class configuration (Page 108) If you have adapted the predefined alarm/message class configuration for DB2 alarms and converted to the extended DB2 alarms in STEP 7 V5.5 SP4 or in the TIA Portal, transfer your user-defined alarm/message class configuration here.
12	Adapt or transfer the telegram configuration (Page 86) If you deploy a user-defined telegram configuration, convert here either to the standard telegram configuration or transfer your user-defined I/O addresses to the SINUMERIK ONE.
13	Replacing the call of LBP_ConfigBP [FB1] in OB Startup [OB100] with LBP_ConfigBP [FC1] (Page 109)

See also

Supplementary conditions for calling LBP_NCKProcessIRT [FC3] in OB hardware interrupt [OB40] (Page 111)

8.2 Migrate the PLC program to a SINUMERIK ONE (PLC migration)

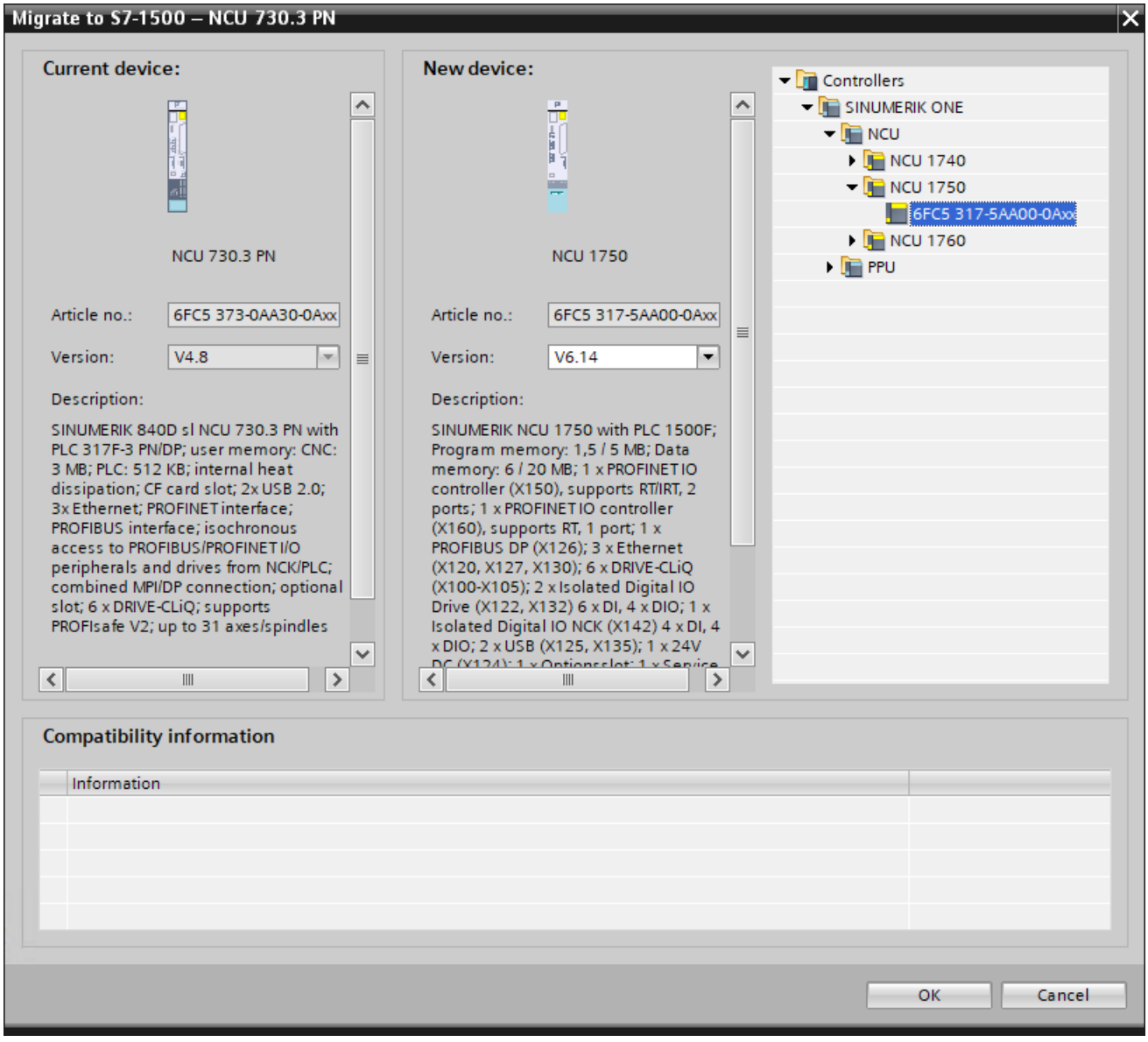
Requirement

- The PLC program of the SINUMERIK 840D sl is compiled.

Procedure

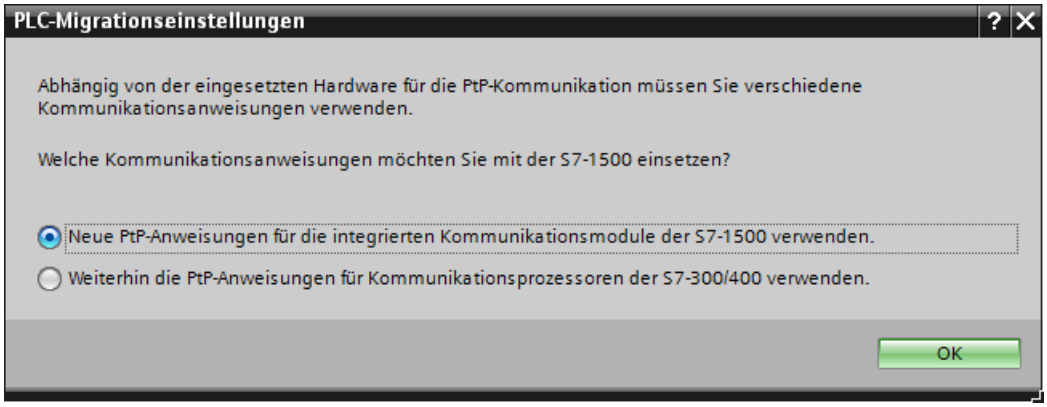
To migrate the PLC program of a SINUMERIK 840D sl to a SINUMERIK ONE in the TIA Portal, proceed as follows:

1. Right-click the NCU and select the "Migrate to S7-1500" command.
   The "Migrate to S7-1500" dialog opens.



2. Select the SINUMERIK ONE and confirm with "OK".

3. Confirm the security warning "Check program after migration" with "OK".
   The "PLC migration settings" dialog opens.



4. Select whether S7-300-PtP program blocks should be replaced automatically by the appropriate new S7-1500 operations and confirm with "OK".
   The migration ends with a dialog from which the migration log can be called.

Result

The SINUMERIK ONE is added with default settings and the PLC program is migrated with its components.

After migration, your project contains two NCUs, because the NCU1750 is created parallel to the 7x0.

You can find the migrated components in the project navigation at SINUMERIK ONE (e.g. at "CNC_1 > PLC_1"):

- Program blocks of the SINUMERIK basic PLC program with user-specific adaptations or without know-how protection.
- Dummy blocks added for the migration
- Program blocks of the PLC user program whose creation language is supported by S7-1500, but do not have any know-how protection.
- PLC variable tables
- Monitoring and force tables
- PLC data types
- Technology objects
- User-defined groups in the project navigation

The hardware configuration of the SINUMERIK 840D sl is not transferred automatically.

Further information

- A comparison of the PtP communications operations of the S7-1500 and S7-300 PLCs can be found in the TIA Portal online help with the search term "Migration of PtP program blocks".
- Scope of migration (Page 33)

8.3 Checking the migration log

The migration log, the messages from the compilation (Page 85) and the tables in the Appendix (Page 150) help you with assessing the migration result.

Because some problems can be rectified easier on the starting project, it can be desirable to discard a migration result, to edit the starting project and to migrate again.

Consequently, analyze the messages to get an overview of the migration result before investing unnecessary time in reworking the migration result.

Difference between errors and warnings

These messages are separated into errors and warnings. Errors must always be rectified so that the program can be compiled and can run. Warnings must be checked individually to determine whether they lead to problems.

Basic procedure

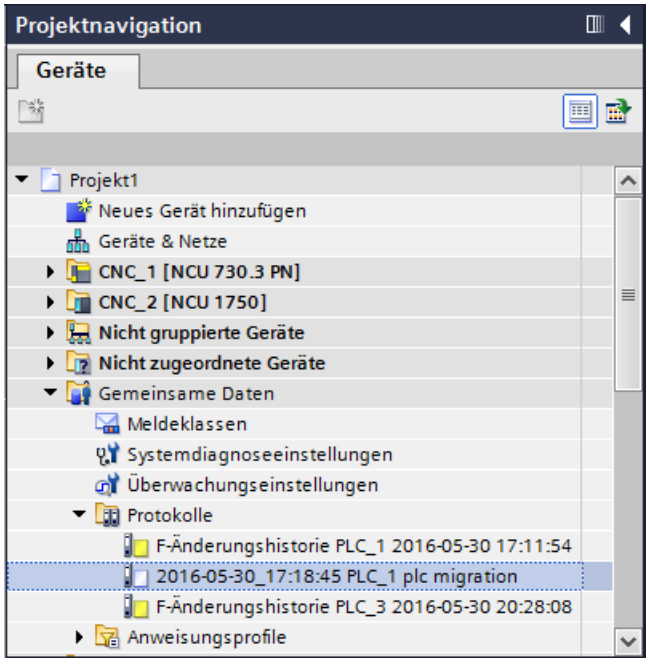
Consult the tables in the Appendix (Page 150) to determine in which step of the migration process an error can be rectified easiest:

- In the TIA Portal on the SINUMERIK 840D sl
  In many cases, it can be desirable to discard a migration result, to rectify the errors in the PLC program of the SINUMERIK 840D sl shown in the migration log or during the compilation (Page 85), and to migrate again.
- After PLC migration to the SINUMERIK ONE
  Some of the displayed problems can be rectified only after migration to a SINUMERIK ONE.

Displaying the migration log

The migration log is stored at the following location in the project navigation:

- "Common data > Logs"



Use the log to check whether you can accept the migration result or you need to rectify the listed problems on the SINUMERIK 840D sl and migrate again.

8.4 Deleting blocks after the PLC migration

Safety Integrated (SPL) is no longer supported by SINUMERIK ONE (see Chapter Removing the Safety Integrated (SPL) program (Page 76)). If you deploy the DB18 SPL block in your project, you must delete it after the PLC migration.

Basic procedure

If you have deployed this Safety operating mode, you must remove the DB18 SPL block as well as all accesses to functions and function blocks, and to signals for data blocks from your PLC program.

8.5 Interconnect peripherals with SINUMERIK ONE

During the migration, the PLC program was added to the SINUMERIK ONE without copying the peripherals or interconnection. The peripherals can be interconnected with the SINUMERIK ONE.

If you duplicate the modules previously as described here, the old modules remain available in the project so they can be used as reference.

Note

Interconnecting NX modules with SINUMERIK ONE

NX modules of the SINUMERIK 840D sl cannot be interconnected with the SINUMERIK ONE or be converted to NX modules of the SINUMERIK ONE ("Replace device").

Add the new NX modules and interconnect them with the SINUMERIK ONE.

Adapt settings, such as DP address or the telegram configuration, as needed.

See also: Standard telegram configuration of a SINUMERIK ONE (Page 153)

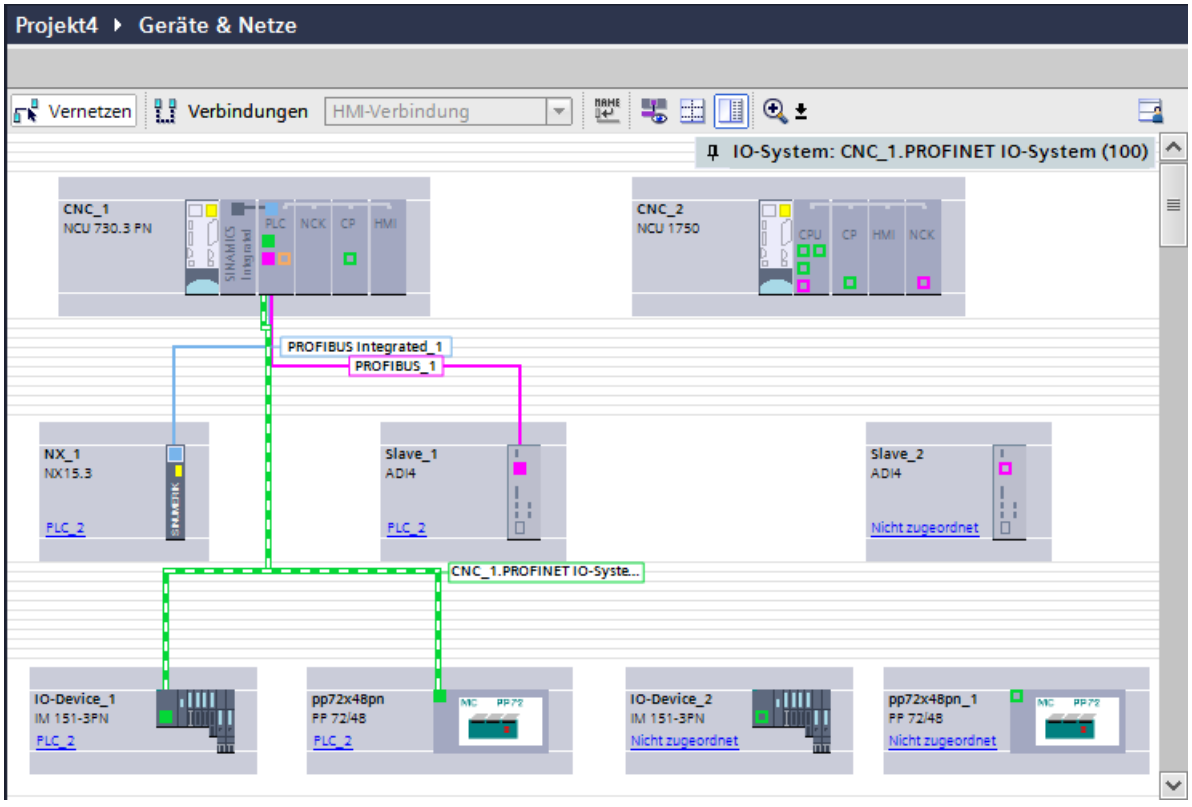
Requirement

- The PLC program of the SINUMERIK 840D sl is migrated to a SINUMERIK ONE.
- The peripherals should be reused unchanged or may already have been migrated individually.
  Information about the migration of SIMATIC peripherals (such as ET200S to ET200SP) can be found in the online help of the TIA Portal with the search term "Migrating PLC programs to an S7-1500-CPU / ET200SP".
- Safety Integrated (F-PLC) is activated (Page 123).

Procedure

To interconnect your peripherals with the SINUMERIK ONE, proceed as follows:

1. In the net view, select all peripherals, for example by dragging a selection rectangle around them.
2. Use the "Copy" and "Paste" commands.
   The peripherals are pasted non-interconnected.



3. For each peripheral, click "Not assigned", then select the SINUMERIK ONE as master system.

8.6 Checking the compilation messages

Basic procedure

Use the compilation messages and the tables in the Appendix (Page 150) to check whether you can accept the migration result or you need to rectify the listed problems for the starting project and migrate again.

Displaying compilation messages

When you compile the hardware and software, a check is made for further problems that possibly may not be listed in the migration log (Page 80). These messages are displayed in the "Info > Compile" inspector window.

1. In the project navigation, right-click the PLC and select the "Compile > Software (compile all)" or "Compile > Hardware (compile all)" command.

Problems can also be listed in the compilation messages that can be rectified easier in the starting project.

8.7 Transferring a telegram configuration

8.7.1 Overview

The PLC migration does not include the automatic transfer of the telegram configuration of a SINUMERIK 840D sl (or NX modules).

The NCU 1750 newly-added during the PLC migration contains the standard telegram configuration of a SINUMERIK ONE that may differ (Page 153) somewhat from the standard telegram configuration of a SINUMERIK 840D sl.

The PLC migration, however, transfers the accesses to the telegram I/O addresses in the PLC program to the "PLC variables" editor without adapting the associated I/O addresses automatically.

You must make various adaptations appropriate for the telegram configuration of your starting system and of the desired configuration of the target system:

Telegram configuration of the starting system	**Desired telegram configuration of the target system**	**Procedure**
Standard telegram configuration of the SINUMERIK 840D sl	Standard telegram configuration of the SINUMERIK ONE (recommended)	Check the differences of the standard telegram configurations (Page 153) and make adaptations at the following places: • Check the machine data and adapt to the new standard (Page 87) • Check the I/O addresses of the migrated PLC variables and adapt the differences to the new standard (Page 87)
	Standard telegram configuration of the SINUMERIK 840D sl (not recommended)	Enter the user-defined telegram configuration in the TIA Portal (Page 88)
User-defined telegram configuration	User-defined telegram configuration	
	Standard telegram configuration of the SINUMERIK ONE	Check the differences of the standard telegram configurations (Page 153) and make adaptations at the following places: • Check the machine data and adapt to the new standard (Page 87) • Check the I/O addresses of the migrated PLC variables and adapt the differences to the new standard (Page 87)

See also

Activating Safety Integrated in the TIA Portal (Page 123)

8.7.2 Adapting the I/O addresses in the machine data

If you want to use the standard telegram configuration on the SINUMERIK ONE, you must make some adaptations, because they differ from the standard telegram configuration of a SINUMERIK 840D sl.

Requirement

- The machine data or the complete system are backed up in an archive so that after adapting the machine data for SINUMERIK ONE, a configuration that can run on SINUMERIK 840D sl is backed up.
  Alternatively, you can perform this migration step even after the archive migration to the SINUMERIK ONE.

Procedure

To enter the I/O addresses of the optimized addressing schematic in the machine data, proceed as follows:

1. Call or print out the tabular overview of the standard I/O addresses with the associated machine data:
   – Standard telegram configuration of a SINUMERIK ONE (Page 153)
2. Switch in SINUMERIK Operate to the general machine data via "MENU SELECT > Commissioning > Machine data > General MD".
3. Search for the associated machine data ("Search" softkey) and enter the I/O addresses (each for the deployed drives) in all cases where they deviate from the standard I/O address of the SINUMERIK ONE.

8.7.3 Adapting accesses to telegram I/O addresses in the user program (PLC variables)

The PLC migration transfers the accesses to the telegram I/O addresses in the PLC program to the "PLC variables" editor without adapting the associated I/O addresses automatically to the standard telegram configuration of the SINUMERIK ONE.

In some migration situations (Page 86), you must adapt the accesses to the telegram I/O addresses in your user program.

Basic procedure

To find and adapt the accesses to telegram I/O addresses, proceed as follows:

- Migrated PLC variables can be found in the "PLC variables" editor in the project navigation, e.g. at "CNC_1 > PLC_1 > PLC variables > Standard variable table".
- Those addresses that are not deployed can be checked in the Assignment plan that you can open from the associated context menu command.

- PLC variables for telegram I/O addresses in the assignment plan are classified as "No hardware configured" and so yellow-highlighted.

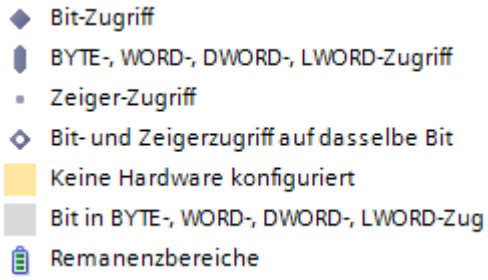


Figure 8-1 Legend for highlighting in the assignment plan

- A tabular overview of the standard I/O addresses can be found in the Appendix (Page 153).

8.7.4 Transferring a user-defined telegram configuration

After the PLC migration, you can adapt the I/O addresses configured in the TIA Portal to your user-defined I/O addresses. (To use a SINUMERIK ONE with the standard telegram configuration of a SINUMERIK 840D sl, also applies in this case as user-defined telegram configuration.)

If you want to adapt the I/O addresses in the TIA Portal, you should make this step only when you are sure that all other components have been migrated correctly.

Requirement

- The NX modules to be deployed are added (Page 83) to the configuration.
- Safety Integrated (F-PLC) is activated (Page 123) (provided this should be deployed). Safety Integrated (F-PLC) must be activated before adapting the telegram I/O addresses, because telegrams 701 and 902 are added only when Safety mode is activated.

Entering user-defined I/O addresses in the TIA Portal

To adapt the I/O addresses of the telegrams used in the TIA Portal, proceed as follows:

1. Select the SINAMICS Integrated or NX and click "Cyclic data exchange" in the "Properties" inspector window.
2. Enter your user-defined start addresses in the "Partner data area" field of the individual telegrams.
   To display the I/O addresses of the starting device and the new device concurrently, you can, for example, open two instances of the TIA Portal.

8.7.5 Reinserting additional telegrams after migration

Newly introduced telegrams as of V4.95, e.g. telegrams 1100 and 146, are configured in STEP 7 Classic as "Additional telegrams PZD extension". During project migration of STEP 7 Classic projects with "Additional telegrams PZD extension", these are migrated and displayed as "Free telegrams" in the TIA Portal.

After PLC migration and hardware replacement in SINUMERIK ONE, the standard telegram configuration of a SINUMERIK ONE is always active and the "Additional telegrams PZD extension" previously configured in the STEP 7 Classic project are no longer displayed.

Reinsert any additional telegrams that are no longer available in the migrated TIA Portal project in accordance with the original project. These are, for example, telegrams 146 and 1100.

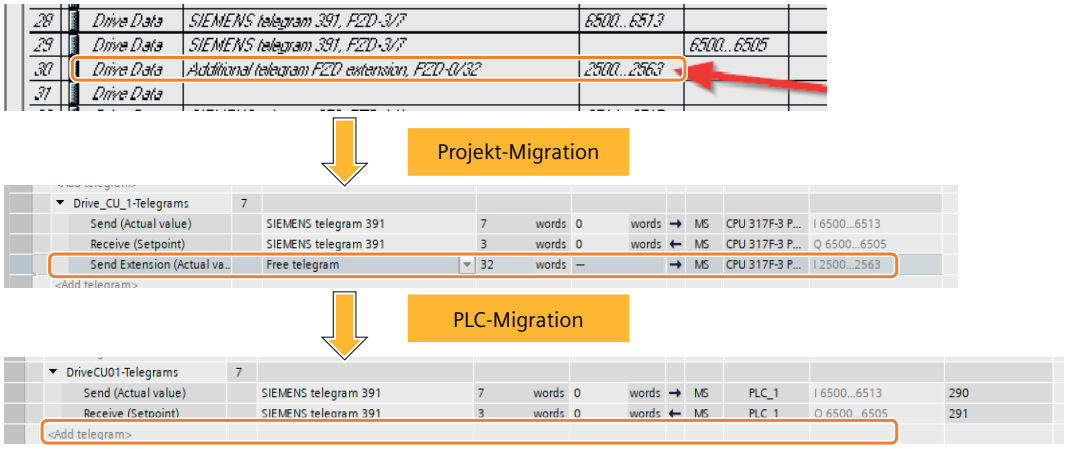


Figure 8-2 Additional telegram after project and PLC migration of a STEP 7 Classic project

How to reinsert additional telegrams after migration

Proceed as follows if you want to reinsert additional telegrams that are no longer present after the migration. The procedure is illustrated using telegram 1100 as an example.

1. Open the telegram configuration of SINAMICS Integrated.
2. Navigate to the drive object where the telegram is to be inserted.
3. Click on "Add telegram" and select telegram 1100.
4. Adjust the address range according to the source project.

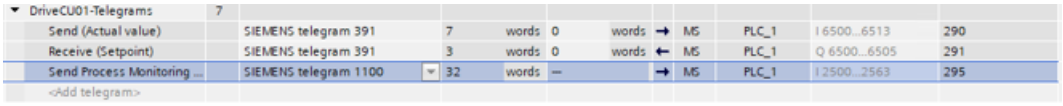


Figure 8-3 Adding a telegram using the example of telegram 1100

8.8 Preparing the conversion from FB4 to LBP_ReqPIService [FB7]

The following adaptations are required only when you migrate your project from STEP 7 V5.5 SP4 where the parameter transfer of the FB4 calls has already been adapted.

In this migration step, change the previously edited calls of the migration FB4 "LBP_ReqPIService_MigFB4" to calls of the "LBP_ReqPIService [FB7]".

Requirement

- Parameter transfers for FB4 calls are converted to the extended FB7 interface (Page 62).

Procedure

To complete the conversion of "LBP_ReqPIService_MigFB4 [FB4]" to "LBP_ReqPIService [FB7]", proceed as follows:

1. In the "Program Blocks" folder, right-click "LBP_ReqPIService_MigFB4 [FB4]" and select the "Cross-references" command.
2. Check the cross-reference list successively for all calls of the following types and edit them:

Type	Procedure
Multi-instance	1. Check the cross-reference list for all hits that contain the "Data type" text and double-click the associated code. 2. Change each name of the data type from "LBP_ReqPIService_MigFB4" to "LBP_ReqPIService".
Single-instance	1. Search in the cross-reference list for FB4 calls with single-instances and open them. 2. Change each name of the data type from "LBP_ReqPIService_MigFB4" to "LBP_ReqPIService". 3. Right-click "LBP_ReqPIService" and select the "Change instance" command and confirm with "OK".

Note

Converting absolute accesses

If you also use absolute addressing, adapt here the block number of the instance DB created in the previous step:

1. First delete the superfluous instance DB of FB4.
2. Then in the project navigation, right-click the newly-created instance DB (from Step 2.3 above) and open the properties.
3. Activate the "Manual" option at Number and enter the number used in the absolute accesses.
4. Confirm with "OK".

Note

Setting any unassigned mandatory parameters for programming in STL or SCL

In the SINUMERIK 840D sl environment, the FB4 input parameters "PIService" as well as "Addr1" to "Addr4" have the "ANY" type and consequently do not need to be initialized. In the SINUMERIK ONE, these input parameters have the "Variant" type in FB7. This causes the following compilation errors for the replacement of FB4 by FB7 in STL if the named input parameters were previously unassigned:

"The required operand at the input/output is missing or has an incorrect data type"

In the SCL environment, for example, the following compilation error results:

"Parameter 'Addr4' must be supplied."

Consequently, the unassigned "PIService", "Addr1", "Addr2", "Addr3" and "Addr4" input parameters must be assigned "NULL".

3. In the "Program Blocks" folder of the project navigation, right-click "LBP_ReqPIService_MigFB4 [FB4]", select the "Delete" command and confirm with "OK".

8.9 Conversion from FB4 to LBP_ReqPIService [FB7] for the migration of the SINUMERIK 840D sl (TIA Portal)

The following adaptations are required only when you migrate your project starting at the TIA Portal. If you begun the migration in STEP 7 V5.5 SP4, the conversion from FB4 to FB7 was already made as shown in Chapters "Preparing the conversion from FB4 to LBP_ReqPIService [FB7] (Page 62)" and "Preparing the conversion from FB4 to LBP_ReqPIService [FB7] (Page 90)".

In this migration step, change the calls from PI_SERV [FB4] to calls of the "LBP_ReqPIService [FB7]".

Requirement

You begun the migration starting from a SINUMERIK 840D sl project in the TIA Portal.

Procedure

To convert from "PI_SERV [FB4]" to "LBP_ReqPIService [FB7]", proceed as follows:

1. In the "Program Blocks" > "Single Blocks" folder, right-click "PI_SERV [FB4]" and select the "Cross-references" command.
2. Check the cross-reference list successively for all calls of the following types and edit them:

Type	Procedure
Multi-instance	1. Check the cross-reference list for all hits that contain the "Data type" text and double-click the associated code. 2. Change each name of the data type from "PI_SERV" to "LBP_ReqPIService".
Single-instance	1. Search in the cross-reference list for FB4 calls with single-instances and open them. 2. Change each name of the data type from "PI_SERV" to "LBP_ReqPIService". 3. Right-click "LBP_ReqPIService" and select the "Change instance" command and confirm with "OK".

Note

Converting absolute accesses

If you also use absolute addressing, adapt here the block number of the instance DB created in the previous step:

1. First delete the superfluous instance DB of FB4.
2. Then in the project navigation, right-click the newly-created instance DB (from Step 2.3 above) and open the properties.
3. Activate the "Manual" option at Number and enter the number used in the absolute accesses.
4. Confirm with "OK".

Note

Setting any unassigned mandatory parameters for programming in STL or SCL

In the SINUMERIK 840D sl environment, the FB4 input parameters "PIService" as well as "Addr1" to "Addr4" have the "ANY" type and consequently do not need to be initialized. In the SINUMERIK ONE, these input parameters have the "Variant" type in FB7. This causes the following compilation errors for the replacement of FB4 by FB7 in STL if the named input parameters were previously unassigned:

"The required operand at the input/output is missing or has an incorrect data type"

In the SCL environment, for example, the following compilation error results:

"Parameter 'Addr4' must be supplied."

Consequently, the unassigned "PIService", "Addr1", "Addr2", "Addr3" and "Addr4" input parameters must be assigned "NULL".

3. In the "Program Blocks" > "Single Blocks" folder of the project navigation, right-click "PI_SERV [FB4]", select the "Delete" command and confirm with "OK".

8.10 Inserting PLC data types

The PLC interface data blocks of the basic program make it possible to access various interfaces and data from the PLC program (axes/spindles, channels, mode groups, alarms/messages, tool management, PLC/HMI, MCP/HT).

PLC data types (UDT), which define the content of the data blocks, are available in the system library of the SINUMERIK ONE PLC basic program. Copy these PLC data types into your project.

Procedure

Proceed as follows to copy the PLC data types into your project:

1. Switch to task card "Libraries" and open system library "SINUMERIK ONE PLC Basic Program V6.x"
2. Drag and drop the folder "Master copies > SINUMERIK ONE PLC Basic Program > SINUMERIK ONE PLC BP data types" into the folder PLC data types of your project (e.g. under "CNC_1 > PLC_1 > PLC data types").

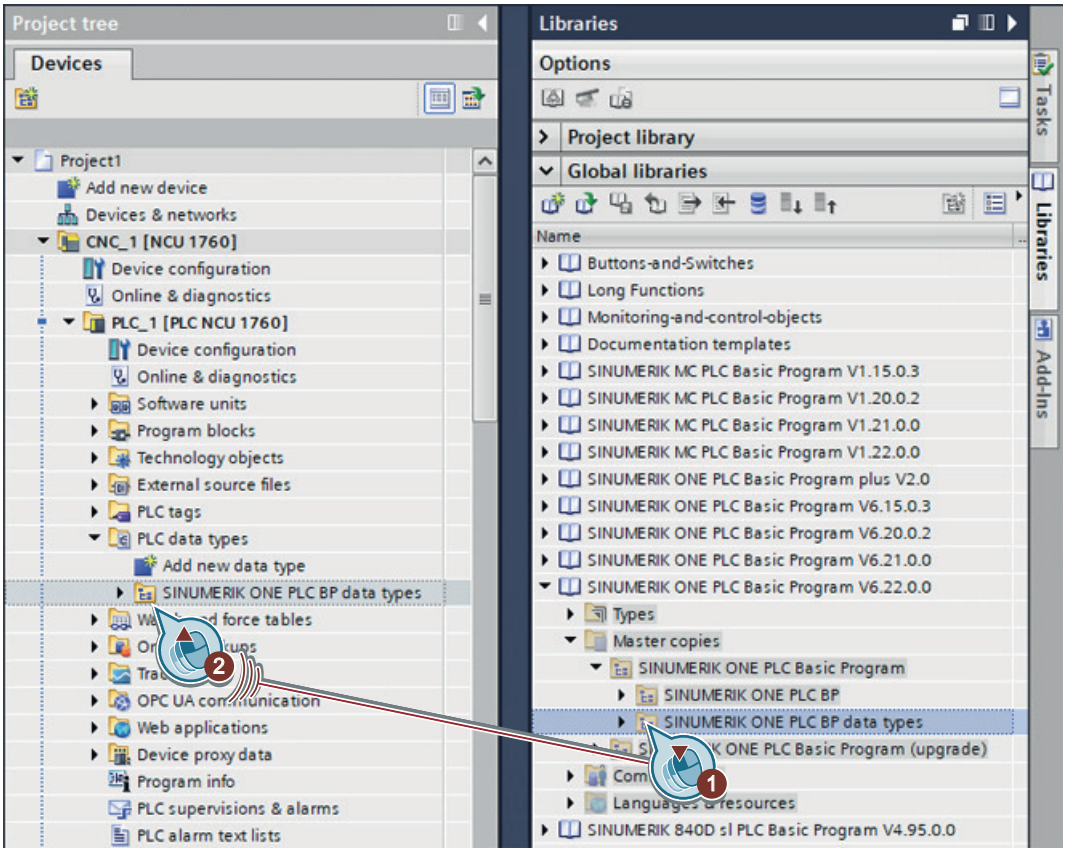


Figure 8-4 Inserting PLC data types using the example of SINUMERIK ONE PLC Basic Program V6.x using the example of V6.22

Result

The data types were copied into your project and assigned to the corresponding blocks of the PLC basic program.

Note

Deleting unused data types

Check the "PLC data types" folder, if applicable, for data types that are not used by the blocks. By inserting the SINUMERIK ONE PLC data types, for example, no (obsolete) data types of the SINUMERIK 840D sl are overwritten, since they have different names.

8.11 Inserting the basic program blocks of the ONE library

8.11.1 Requirement

The block number ranges of the SINUMERIK basic PLC program in the project are not assigned blocks from other creators, e.g. user blocks, or third-party blocks or blocks from other Siemens products (e.g. DB_HMI [DB59] from Transline). The block number ranges of the SINUMERIK basic PLC program are shown in the tables in Appendix PLC basic program blocks (Page 129).

Note

Procedure for the assignment of the SINUMERIK number range by blocks from other creators

Unlike the procedure for the complete transfer of the basic program blocks described later, you must transfer the required basic blocks individually from the library to your project, and so overwrite the previously added dummy blocks.

8.11.2 Procedure

8.11.2.1 Step 1: Add all blocks of the basic PLC program in Version 6.x

To add all blocks of the basic PLC program in Version 6.x, proceed as follows:

1. Switch to the "Libraries" task card and open the "SINUMERIK ONE basic PLC program *[Version]*" system library.
2. Open the "Copy Templates > ONE basic PLC program (upgrade)" subfolder.

   Note

   "...(upgrade)" subfolder

   Use the "...(upgrade)" subfolder. This differs from the complete library by the absence of the DB75 (LBP_MFuncDecListConfig) and DB5 (LBP_ParamAlarmMsgs) data blocks. This prevents these two data blocks that may have customer-specific adaptations in the project to be migrated from being overwritten by SINUMERIK library blocks with default values.

3. Drag-and-drop the "ONE PLC BP" copy template to the "Program Blocks" folder, e.g. at "CNC_1 > PLC_1 > Program Blocks".

Note

Copying the "ONE PLC BP" folder overwrites any user blocks

If user blocks from the reserved number range of the SINUMERIK basic program are used in your project, you must not copy the complete folder. You must copy each required basic program block to prevent your own blocks from being overwritten. Caution: There are some mutual dependencies in the basic program (see Blocks of the PLC basic program that cannot be migrated (automatically) (Page 134)).

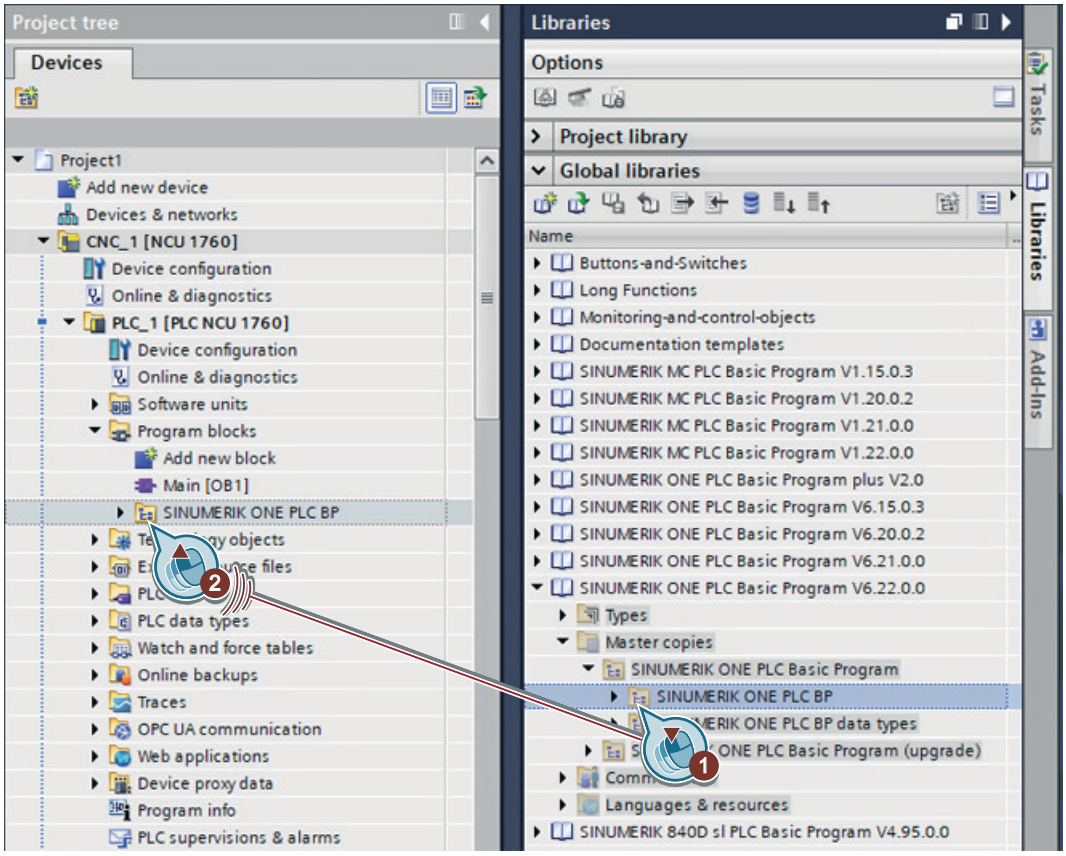
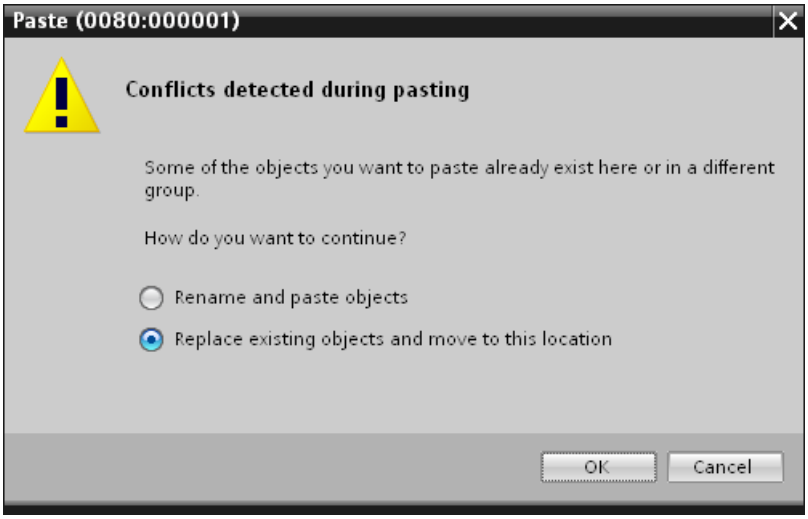


Figure 8-5 Adding the PLC basic program

The blocks are copied to your project. A check is made for duplicate block names, in which case the "Conflicts during copying" dialog is displayed.



Note

Copying this folder changes the user-defined folder structure

Copying the "ONE PLC BP" folder automatically creates new groups (subfolders) in your "Program Blocks" folder and moves the existing blocks there.

If you have already organized the basic PLC program into separate groups and would like to keep this structure, copy the individual block copy templates from the lower-level folders instead.

(With the Ctrl or shift key, you can select several objects of the same type and then copy them.)

4. Select the "Replace existing objects and move them to this location" option and confirm with "OK".

8.11.2.2 Step 2: If required, add LBP_ParamAlarmMsgs[DB5] and LBP_MFuncDecListConfig[DB75]

The "ONE basic PLC program (upgrade)" directory was used to add know-how protected basic program blocks. The "LBP_ParamAlarmMsgs [DB5]" and "LBP_MFuncDecListConfig[DB75]" data blocks are missing in this directory. This prevents any customer-specific values in the original DB5 or DB75 from being overwritten unintentionally. The new DB5 and DB75 are, however, required for the project to be compiled successfully.

If you have not changed DB5 or DB75 in your project, you must still copy the two blocks. To do this, proceed as follows:

1. Open the "Copy Templates > ONE basic PLC program" subfolder in the "SINUMERIK ONE basic PLC program V6.XX" system library.
2. Drag-and-drop the "LBP_ParamAlarmMsgs[DB5]" or "LBP_MFuncDecListConfig[DB75]" copy template to the appropriate "Program Blocks" subfolder.
3. Select the "Replace existing objects and move them to this location" option and confirm with "OK".

However, if you have made changes to DB5 or DB75 in your project, we suggest the following procedure:

1. Open the "Copy Templates > ONE basic PLC program" subfolder in the "SINUMERIK ONE basic PLC program V6.XX" system library.
2. Drag-and-drop the "LBP_ParamAlarmMsgs[DB5]" or "LBP_MFuncDecListConfig[DB75]" copy template to the appropriate "Program Blocks" subfolder.
3. Select the "Rename and add object" option in the "Conflicts during copying" dialog and confirm with "OK".
   DB5 or DB75 is now twice in your project: "LBP_ParamAlarmMsgs[DB5]" and "LBP_ParamAlarmMsgs_1[DB5]" or "LBP_MFuncDecListConfig[DB75]" and "LBP_MFuncDecListConfig_1[DB75]".
4. In the project navigation, right-click "LBP_ParamAlarmMsgs[DB5]" or "LBP_MFuncDecListConfig[DB75]" and select the "Fast comparison" entry in the context menu.
5. Compare the two DB5 or DB75 blocks and make your changes in the new block.
6. Delete the associated old block and rename the new block by deleting the "_1" suffix in "LBP_ParamAlarmMsgs[DB5]" or "LBP_MFuncDecListConfig[DB75]" .

See also

Transferring a user-defined message class configuration (error message / operating message) (Page 108)

PLC basic program blocks (Page 129)

8.11.2.3 Step 3: Compile project

To compile the project, proceed as follows:

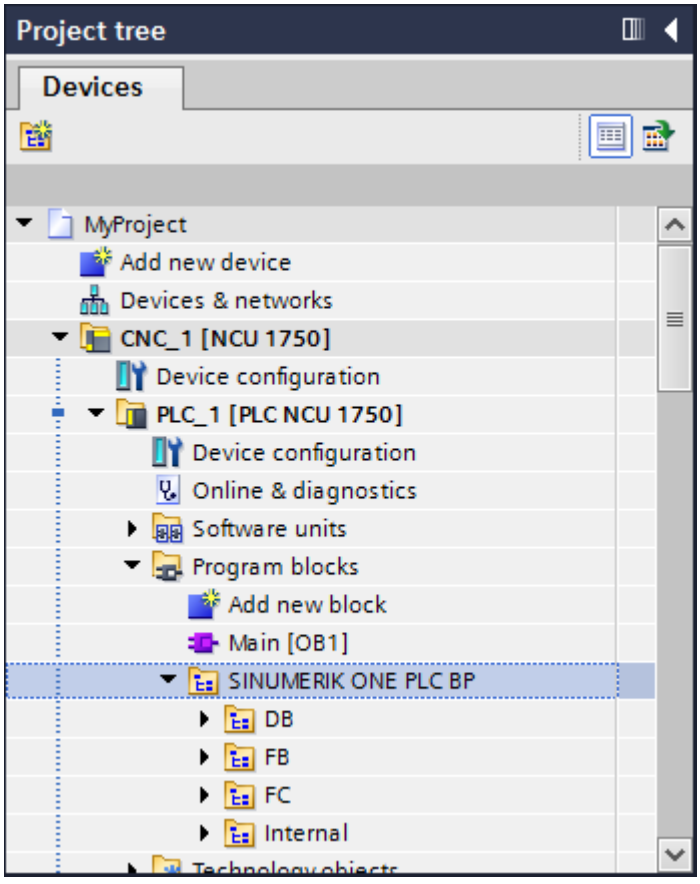
1. In the project navigation, right-click "Program blocks" and select the "Software (compile all blocks)" command in the "Compile" context menu.

See also

Transferring a user-defined message class configuration (error message / operating message) (Page 108)

8.11.3 Result

The blocks of the basic SINUMERIK PLC program have been copied to your project. Whereby, the previously added dummy blocks were overwritten. The folder structure of the copy template was imported.



You can now check the copied blocks and manually delete the SINUMERIK PLC basic program blocks that you do not require (e.g. superfluous axis DB, channel DB, FB or FC).
If you have superfluous blocks in your project, they may affect the duration of some tasks, such as the loading of software into the device. Consequently, superfluous blocks should be deleted from the project.

Superfluous blocks are identified with the "DummyLib" family. By displaying the program blocks in the list view, you can check whether there are still blocks that belong to the "DummyLib" family. The following variants are possible:

- The required basic program blocks were not transferred from the library (e.g. when copying individual blocks).
- You have migrated blocks that are now no longer or not yet supported.

Now compile the complete software of the project.

The compilation may issue errors and warnings, e.g. for blocks and symbols that are no longer supported. Information about the rectification of errors and warnings can be found in Appendix Migration log and compilation messages (Page 150).

8.12 Adding data types - effects for the DB2 conversion in STEP 7 V5.5 SP4

Result and effects for the conversion of the DB2 user concept of a STEP 7 V5.5 SP4 project

If you migrate starting with a STEP 7 V5.5 SP4 project, with completion of this step, the following adaptations have been made to DB2 signal accesses:

- With completion of this handling step, symbolic accesses to DB2 signals refer to the signal identifier of the extended LBP_AlarmMsgs [DB2] and the associated LBP_type_AlarmMsgs [UDT1002].
- Absolute accesses to DB2 signals remain as absolute accesses and refer to the offsets of the extended LBP_AlarmMsgs [DB2].

Note

If necessary, remove a migrated UDT2

If you have migrated a UDT2 from STEP 7 V5.5 SP4, it was not overwritten when new data types were added and it exists as UDT1002 and UDT2.

Delete the superfluous UDT2.

If you migrate starting with a TIA Portal project, make these adaptations first in Chapter Converting LBP_AlarmMsgs [DB2] to the PLC alarm extension (Page 103).

8.13 Converting LBP_AlarmMsgs [DB2] to the PLC alarm extension

The following adaptations for converting the user alarm concept are required only when you have already migrated your SINUMERIK 840D sl PLC project and have worked in the meantime in the TIA Portal without converting the user alarm concept.

If you migrate to SINUMERIK ONE and do not want to work with a SINUMERIK 840D sl in the TIA Portal, convert the user alarm concept in STEP 7 V5.5 SP4 instead (Page 47).

Requirement

- The blocks of basic PLC program 6.x have been added.
  See: Inserting the basic program blocks of the ONE library (Page 97), Inserting PLC data types
- DB5 exists or has been added from the SINUMERIK ONE library.

Overview

The steps to be performed in this chapter depend on which methods are used in your user program to access DB2:

- Direct access to DB2 with symbol signal identifiers (Page 103)
- Direct access to DB2 with absolute signal addresses (Page 105)
- Indirect access to DB2 using user DB and BLKMOVE operation (Page 104)

If, for example, you access DB2 sometimes symbolically and sometimes absolutely, you must make both adaptation steps.

8.13.1 Conversion for symbolic access to DB2 signals

Procedure

To adapt the symbolic accesses to DB2 in the TIA Portal (for the purpose of conversion to the user alarm concept "ExtendAlMsg=True"), proceed as follows:

1. Right-click the "Program Blocks" folder and select the "Search project" command.
   The "Search project" editor opens and the search range is limited to the "Program Blocks" folder.
2. Enter "`LBP_AlarmMsgs`" in the "Search for" text field and confirm with "Start search".
3. Open the affected program locations successively and adapt the symbolic identifiers as described at Comparison of symbolic identifiers for DB2 signals (Page 145).
4. Right-click the "Program Blocks" folder and select the "Compile > Software (compile all blocks)" command.
   The PLC program is compiled and a check is made for the correct symbolic addressing of the DB2 signals, etc.

8.13.2 Conversion for indirect access via BLKMOV

8.13.2.1 Checking and adapting copied memory areas

The offset addresses of both DB2 variants have the same structure within the individual DB2 areas[1], each offset by a specific value. This offset is, however, different for each DB2 area.

Check whether you use BLKMOV copy operations that copy a memory area larger than a DB2 area. If you copy such memory areas, you must divide the copy operation into several operations.

[1]See: "Area" column in the Comparison of offsets in DB2 variants (Page 144) table

Basic procedure

To divide the BLKMOV operations, proceed as follows:

1. The following options are available to find the affected locations in your user program:
   - Right-click the "Program Blocks" folder and select the "Search project" command.
   - Right-click "LBP_AlarmMsgs [DB2]" and select the "Cross-reference list" command.
2. Open those blocks with BLKMOV copy operations that copy the data of multiple DB2 areas concurrently (or copy a memory area larger than a DB2 area).
3. Divide the associated BLKMOV operations into several operations so that each copies the data of just one area.
   The individual DB2/alarm number areas can be found at Comparison of the addresses in DB2 (Page 144).

8.13.2.2 Adapting the copy target for BLKMOV

The offset addresses of both DB2 variants have the same structure within the individual DB2 areas[1], each offset by a specific value. This offset is, however, different for each DB2 area.

Consequently, you must consider the new offset address appropriate for the associated DB2 area and adapt it appropriately.

[1]See: "Area" column in the Comparison of offsets in DB2 variants (Page 144) table

Basic procedure

To adapt the target memory addresses for BLKMOV operations by copying the data to DB2, proceed as follows:

1. The following options are available to find the affected locations in your user program:
   - Right-click the "Program Blocks" folder and select the "Search project" command.
   - Right-click LBP_AlarmMsgs [DB2] and select the "Cross-reference list" command.
2. Open those blocks that copy data via BLKMOV to DB2.
3. Depending on whether the target memory area in DB2 is addressed absolutely or symbolically, proceed as follows:
   - Absolute address: Change each offset address of the BLKMOV target memory area. The new offset address results from the sum of the previous address and the "offset".
     A comparison of the associated offset addresses and the address offset can be found in the appropriate table (Page 144).
   - Symbolic identifier: Adapt the symbolic identifiers as described at Comparison of symbolic identifiers for DB2 signals (Page 145).

8.13.3 Conversion for absolute access to DB2 signals

Procedure

To convert the access to absolute signals for DB2 in the TIA Portal, proceed as follows:

1. The following options are available to find the affected locations in your user program:
   - Right-click the "Program Blocks" folder and select the "Search project" command.
   - Right-click "LBP_AlarmMsgs [DB2]" and select the "Cross-reference list" command.
2. Open the affected program locations successively and convert the offset addresses of the associated DB2 signals. The new offset address results from the sum of the previous address and the "offset".
   A comparison of the associated offset addresses and the address offset can be found in the appropriate table (Page 144).

8.13.4 Removing the user-defined numeric value parameter assignment of the 2nd user alarm decade

If you have adapted the 2nd digit (2nd decade of alarm number 7dx.xxx) user-defined in the user area (alarm numbers 7dx.xxx), you must remove these adaptations. SINUMERIK ONE does not support values that differ from the standard "0".

After the PLC migration to SINUMERIK ONE, any existing values for the "2nd decade" in LBP_ParamAlarmMsgs [DB5] have no effect. The existing DB5 array "UserDek2No [.]" in the SINUMERIK 840D sl basic PLC program has been renamed as "ByteArray72 [.]".

Basic procedure

To remove the user-defined numeric value parameter assignment of the 2nd user alarm decade, proceed as follows:

- In LBP_ParamAlarmMsgs [DB5], set all values in LBP_ParamAlarmMsgs.ByteArray72[.] to 0. Values that differ from the standard value 0 have no effect.
- If the PLC program writes these values with program operations (such as in OB100) in the LBP_ParamAlarmMsgs [DB5], these operations must be removed.
- In the TS files, change (with SINUMERIK Operate) the definition of the alarm texts for alarms 7dx.xxx so that only alarm numbers 70x.xxx are used. To do this, search the TS files for entries with the element <source> and change the associated alarm number.
  These changes must be made before you create the SINUMERIK 840D sl archive for the archive migration.

Further information

Further information about specifying alarm texts can be found in the *SINUMERIK Operate (IM9)* Commissioning Manual at "Configuring alarms".

8.14 Converting accesses to the ZInfo0 DB2 array variable

DB2 with alarm extension provides on 840D sl and also on ONE an array variable that contains an additional value for user alarms from user area 0:

	840D sl (≤ V4.9x)	**ONE (≥ V6.x)**
Identifier	ZInfo0 [0...63]	AddValUserA0 [0...63]

Validity of the description

- If you convert from DB2 without alarm extension to DB2 with alarm extension, you do not need to make any additional adaptation, because AddValUserA0 or ZInfo0 is available only with the alarm extension.
- If you have already deployed DB2 with alarm extension on the 840D sl, you may need to convert the calls of the ZInfo0 array variable.

Procedure

To convert the accesses to ZInfo0 in the TIA Portal, proceed as follows:

1. Right-click the "Program Blocks" folder and select the "Search project" command.
   The "Search project" editor opens and the search range is limited to the "Program Blocks" folder.
2. Enter "`LBP_AlarmMsgs`" in the "Search for" text field and confirm with "Start search".

   Note

   Alternatively, you can call the "Cross-references" command in the context menu for LBP_AlarmMsgs [DB2].

3. Open the affected program locations successively and change ZInfo0 to AddValUserA0.
4. Right-click the "Program Blocks" folder and select the "Compile > Software (compile all blocks)" command.
   The PLC program is compiled and a check is made for the correct symbolic addressing of the DB2 signals, etc.

8.15 Transferring a user-defined message class configuration (error message / operating message)

If you have adapted the predefined alarm/message class configuration for DB2 alarms, you must transfer your adaptations. The migration step is required only when you use a configuration that differs from the standard, i.e. different criteria for differentiating error messages (ErrM: Error Messages) and operating messages (OpM: Operating Messages).

A user-defined adaptation of DB2 alarm/message classes depending on the deployed DB2 variant is contained in the following blocks:

- DB2 variant "ExtendAlMsg = False": Adaptation of the configuration in DB4, OB100 or in a user FB/FC
  Any contained or migrated accesses to the explicit initialization of DB4.BOfeld0... DB4.BOfeld61 (Word), DB4.BOfeld62 (Byte) as well as DB4 are part of the DB2 alarm concept without alarm extension in your user program for the SINUMERIK 840D sl.
  SINUMERIK ONE no longer supports this. Consequently, adapt your user program accordingly.
- DB2 variant "ExtendAlMsg = True": Adaptation of the configuration in DB5, OB100 or in a user FB/FC

We recommend that the user-defined configuration adaptation is entered indirectly via a user FB/FC in the LBP_ParamAlarmMsgs [DB5], rather than directly in DB5 (via the DB editor). User FB/FCs can be transferred easier if you need to upgrade the basic PLC program later.

Assignment between configuration bit and 8-fold group of trigger bits

Each alarm/message class can be defined for a group of 8 alarms that can be triggered via trigger bits in LBP_AlarmMsgs [DB2]:

- Error message (configuration bit in LBP_ParamAlarmMsgs [DB5]:= TRUE)
- Operating message (configuration bit in LBP_ParamAlarmMsgs [DB5]:= FALSE)

Whereby, the following assignment between configuration bit and 8-fold group of trigger bits can be used as example:

Configuration bit (symbol, abs. address)	Group of trigger bits (symbol, abs. address)	Default
LBP_ParamAlarmMsgs.**Ch1**_DB2_**310** (%DB5.DBX0.0)	LBP_AlarmMsgs.**Ch**anA[**1**].FDD_5**C**00xx[0..7] (%DB2.DBB**310**)	8 error messages, Alarm number 510.0xx
LBP_ParamAlarmMsgs.**Ch1**_DB2_**311** (%DB5.DBX0.1)	LBP_AlarmMsgs.**Ch**anA[**1**].FDD_5**C**00xx[8..15] (%DB2.DBB**311**)	8 operating messages, Alarm number 510.0xx
LBP_ParamAlarmMsgs.**Ch1**_DB2_**312** (%DB5.DBX0.2)	LBP_AlarmMsgs.**Ch**anA[**1**].FDD_RID_5**C**01xx[0..7] (%DB2.DBB**312**)	8 error messages, Alarm number 510.1xx
...	...	...
LBP_ParamAlarmMsgs.**Ax1**_DB2_**490** (%DB5.DBX22.4)	LBP_AlarmMsgs.**Ax**isA[**1**].AAFdStop60AAxx[0..7] (%DB2.DBB**490**)	8 error messages, Alarm number 600.1xx
...	...	...

The alarms of the associated alarm group so trigger error messages or operating messages in accordance with the configuration.

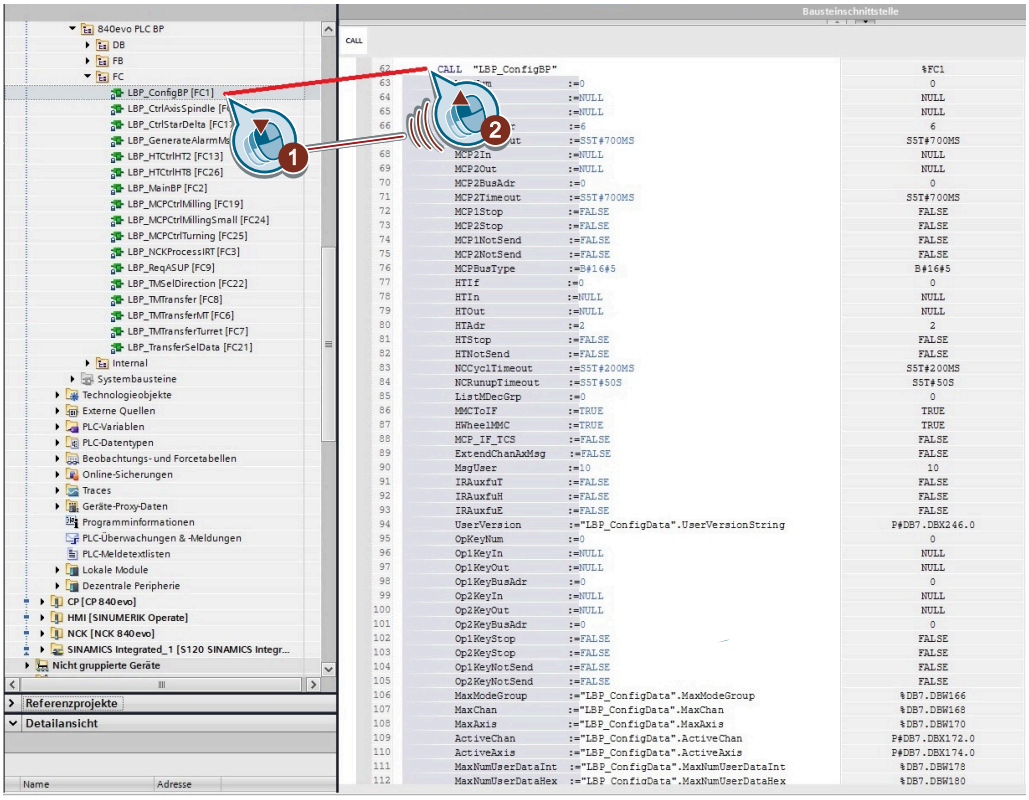
8.16 Replacing the call of LBP_ConfigBP [FB1] in OB Startup [OB100] with LBP_ConfigBP [FC1]

In the SINUMERIK ONE, LBP_ConfigBP [FB1] was replaced with LBP_ConfigBP [FC1]. Consequently, after the PLC migration, the call of LBP_ConfigBP [FB1] in OB Startup [OB100] must be replaced manually with the call of LBP_ConfigBP [FC1].

Procedure

To replace in the TIA Portal, the call of LBP_ConfigBP [FB1] in OB Startup [OB100] with LBP_ConfigBP [FC1], proceed as follows:

1. Open the OB Startup [OB100] for editing.
2. Navigate in the "Program Blocks" folder of the project navigation to the LBP_ConfigBP [FC1] (e.g. at "CNC_1 > PLC_1 > Program Blocks > ONE PLC BP > FC").
3. Drag-and-drop "LBP_ConfigBP [FC1]" to the editing area of the OB Startup [OB100]. This implements the LBP_ConfigBP [FC1] call with pre-assigned actual parameters.



4. Change those parameters that differ from the default values.
5. If you want to transfer PLC machine data in your project, you have stored the CPU-DB DB20, created in the SINUMERIK 840Dsl environment, already as global DB in an earlier migration step (see "Add global DB or DB based on UDT for further blocks (Page 56)"). You must now link the new "UserDataIntArray", "UserDataHexArray" and "UserDataRealArray" parameters with the associated arrays in DB20.

Further information

Further information on handling PLC machine data can be found in the *SINUMERIK ONE PLC* Function Manual under the keyword "PLC machine data" in Chapter "LBP_ConfigBP [FC1]"

See also

FB1 and FC1 comparison (Page 139)

Comparison of symbolic identifiers for DB7 (Page 147)

8.17 Supplementary conditions for calling LBP_NCKProcessIRT [FC3] in OB hardware interrupt [OB40]

The LBP_NCKProcessIRT [FC3] interface has been extended with the "Flags" output parameter of the Variant type. The output parameter must be assigned NULL in the current SINUMERIK ONE. This is performed with compilation automatically during migration. The local data GP_IRFromNCK, GP_TM, GP_InPosition, GP_AuxFunction and GP_FMBlock also migrated are no longer supported.

Alternatively, a temporary variable, e.g. with the name "GP" of type "LBP_typeNCKProcessIRTFlags", can be created and transferred to the Flags output parameter. Upon calling FC3, the following data is then returned which corresponds to the previous OB40 local data: GP.IRFromNCK, GP.TM, GP.InPosition and GP.AuxFunction. There is no equivalent to GP_FMBlock. This local data, however, has not been filled previously and has therefore been deleted with no replacement.

8.18 FB9 Implementing an MCP switchover in the user program

An MCP is no longer switched over with the PLC block FB9. This block is no longer part of the basic program library V6.x. The MCP must be switched over in the user program.

User program as replacement for FB9

To switch over the MCP in the user program, proceed as follows.

1. In OB100 (call of FC1), set "LBP_ConfigData".MCP1BusAdr to 255 and "LBP_ConfigData".MCP1Stop to "TRUE".
2. Query the signal "LBP_NC".E_MMCBTSSready in OB1.
3. Once the signal has been set, write the MCP address from "LBP_HMI".MMC1_MSTT_ADR to "LBP_ConfigData".MCP1BusAdr and delete the MCP stop bit "LBP_ConfigData".MCP1Stop. The MCP is now active.
4. If the signal "MMCBTSSready" is deleted again (operating software switches to another NCU), you must set the MCP stop bit "LBP_ConfigData".MCP1Stop again.

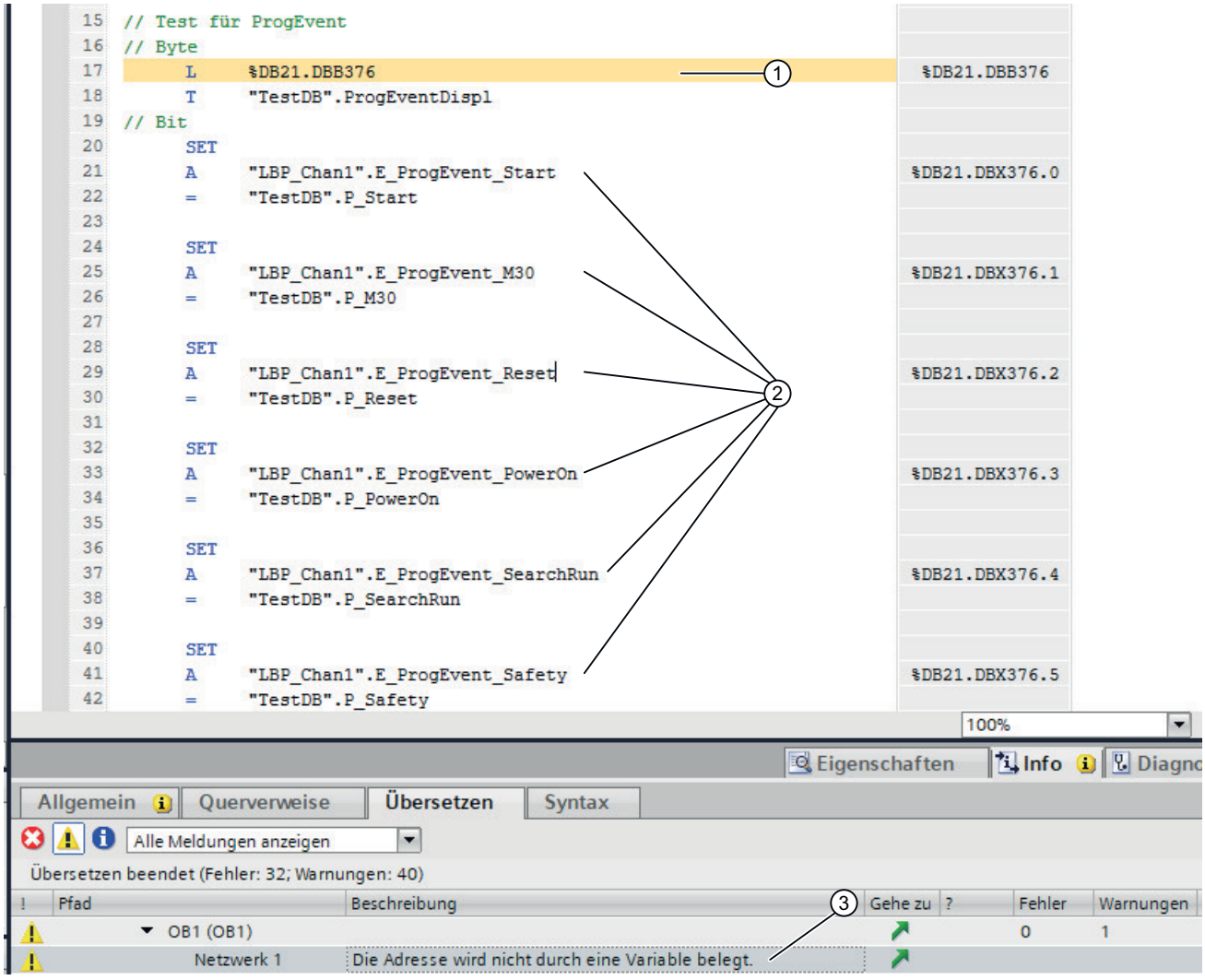
Symbol	Absolute address
"LBP_NC".E_MMCBTSSready	DB10.DBX108.3
"LBP_HMI".MMC1_MSTT_ADR	DB19.DBB123
"LBP_ConfigData".MCP1BusAdr	DB7.DBW26
"LBP_ConfigData".MCP1Stop	DB7.DBX62.1

8.19 Adapting the use of ProcEventDispl in channel DBs

In the SINUMERIK 840D sl environment, byte 376 in the channel DBs (DB21 to DB30) has the "ProcEventDispl" symbol. In the SINUMERIK ONE, the symbolism has changed so that the individual bits in byte 376 each have their own symbol appropriate for their meaning. The following table illustrates this situation.

840D sl UDT21 byte 376	**ONE LBP_typeChanX Byte376**	
ProcEventDispl	376.0	E_ProgEvent_Start
	376.1	E_ProgEvent_M30
	376.2	E_ProgEvent_Reset
	376.3	E_ProgEvent_PowerOn
	376.4	E_ProcEvent_SearchRun
	376.5	E_ProgEvent_Safety
	376.6	f376_6 (reserved)
	376.7	f376_7 (reserved)

If the "ProcEventDispl" symbol was used in the SINUMERIK 840D sl, this causes a compiler warning after the PLC migration because this symbol no longer exists.



① Byte access without symbol
② Use of the SINUMERIK ONE symbols
③ Alarm

Figure 8-6 DBB376: Byte access without symbol causes a compiler warning after the PLC migration

8.20 Substituting the functionality of FC22 (TM_DIR in 840Dsl)

FC22 is no longer available in the library for SINUMERIK ONE. Referred to the location numbers, e.g. of a tool magazine or turret, this block supplied the shortest path and direction of motion for positioning, based on the target and current position. If you used the FC22 in your SINUMERIK 840D sl program, you must emulate its function in the user program of SINUMERIK ONE.

User program output parameters

The following overview demonstrates how you can define the new output parameters for the user program from the existing input parameters of FC22:

Signal	Meaning	New meaning of the user program
MagNo:	Magazine number	Specify the number of magazine locations NumOfPlaces of the magazine to be used instead of the magazine number MagNo.
ReqPos:	Target position	-
ActPos:	Current position	-
Offset:	Offset for special positioning	-
Start:	1 = start of calculation	-

Determining the output parameters

- If offset is > 0, recalculate ReqPos first.
  - ReqPos = ((ReqPos + NumOfPlaces – Offset) MODULO NumOfPlaces)
  - The new target position corresponds to the location number at which the magazine must be positioned so that the original target position is at the location number of the special position.
- Cw: Move magazine clockwise = TRUE
  - If ReqPos > ActPos and the absolute difference between ReqPos and ActPos is less than or equal to half the number of magazine locations.
    Or
  - If ReqPos < ActPos and the absolute difference between ReqPos and ActPos is greater than half the number of magazine locations.
- Ccw: Move magazine counterclockwise = TRUE
  - If Cw = FALSE and ReqPos <> ActPos.
- InPos: Position reached = TRUE
  - If ReqPos = ActPos.
- Diff: Value of differential movement = Abs(ReqPos – ActPos) or NumOfPlaces - Abs(ReqPos – ActPos)
  - If the absolute difference between ReqPos and ActPos is greater than half the number of magazine locations.
  - Error: If the offset is greater than the number of magazine locations (NumOfPlaces), Error = TRUE must be issued. The other output parameters are then invalid.

8.21 Magazine data from DB4 in the PLC program

Using magazine data in the PLC program

The DB4 is no longer part of the basic program library and is no longer evaluated. Configuration of the magazine is now only performed in the NC. If the magazine configuration is required in the PLC user program, the magazine data can be called when calling "LBP_ConfigBP [FC1]" . Create a variable or a data block of the type "LBP_typeTMMagazines".

Examples

Information of the magazine configuration is **used** in the PLC program

```
// tempMagazineData: "LBP_typeTMMagazines"
   "LBP_ConfigBP"(…,
                  TMMagazines => #tempMagazineData);
```

Information of the magazine configuration is **not used** in the PLC program

If no information regarding magazine configuration is required in the PLC user program, the output parameter at the "LBP_ConfigBP [FC1]" can be allocated with ZERO.

```
   "LBP_ConfigBP"(…,
                  TMMagazines => NULL);
```

See also

Migratable blocks of the PLC basic program (Page 129)

8.22 Integrating Powerride LBP_Powerride [FB21]

The function block FB21 "Powerride" integrates a rotary/push control dial (SINUMERIK Powerride) into the SINUMERIK environment. After the PLC migration, the "Powerride [FB21]" (new from V4.94) must be adapted to the "FB LBP_Powerride [FB21]" (new from V6.14).

Procedure

To customize the FB calls in TIA Portal, proceed as follows:

1. Update all calls, since the interface has changed for SINUMERIK ONE (no use of statusId).
   - Click on the call.
   - Select "Update" from the shortcut menu.
2. Change the data type from BYTE to USINT for the following parameters:
   - pushButtonLED
   - presetValue
   - ovrFactor
   - grayCode
   - switchPos
3. Change the type of the following parameters:
   - deviceIn, LBP_typePowerrideInput
   - deviceOut, LBP_typePowerrideOutput
4. Migrate the UDTs used (see table below).

Migration of the used UDTs UDT80 - UDT91

If you use the UDTs UDT80 - UDT91, replace the UDTs according to the following table.

UDT	Type old	Type new
UDT80	TypePowerrideIn	LBP_typePowerrideInput
UDT81	TypePowerrideOut	LBP_typePowerrideOutput
UDT82	TypeModMcpAxisIn	LBP_typeModularMcpAxisInput
UDT83	TypeModMcpAxisOut	LBP_typeModularMcpAxisOutput
UDT84	TypeModMcpBaseIn	LBP_typeModularMcpBaseInput
UDT85	TypeModMcpBaseOut	LBP_typeModularMcpBaseOutput
UDT86	TypeModMcpKeypadRecord	LBP_typeModularMcpKeypadRecord
UDT87	TypeModMcpLedAttribute	LBP_typeModularMcpLedAttribute
UDT88	TypeModMcpModeGroupIn	LBP_typeModularMcpModeGroupInput
UDT89	TypeModMcpModeGroupOut	LBP_typeModularMcpModeGroupOutput
UDT90	TypeModMcpUniversalIn	LBP_typeModularMcpUniversalInput
UDT91	TypeModMcpUniversalOut	LBP_typeModularMcpUniversalOutput

8.23 Operator component communication via Ethernet LBP_OpUnitComm [FB25000]

The new "LBP_OpUnitComm [FB25000]" block is used in SINUMERIK ONE for communication with machine control panels (MCP), handheld terminals (HT), and direct key modules (OpKey) via Industrial Ethernet (IE). For migrated projects, you must consider this block in your PLC user program.

Note

This function is not available in the virtual SINUMERIK.

The parameters are assigned at the FC1 as an Ethernet machine control panel with inputs from bit E0.0 and outputs from bit A0.0 (also possible symbolically via variable table).

Function

The parameters for the configuration can be set in the startup OB (e.g. "Startup [OB100]") via "LBP_ConfigBP [FC1]". Additional factors or a changed configuration of the connections can be set in the cycle via the parameters in "LBP_ConfigData [DB7]".

"LBP_OpUnitComm [FB25000]" should be called in the PLC cycle before calling LBP_MCPCtrlMilling [FC19], LBP_MCPCtrlMillingSmall [FC24], LBP_MCPCtrlTurning [FC25], LBP_HTCtrlHT8 [FC26] and LBP_HTCtrlHT2 [FC13] or before accessing input data, for example, after calling LBP_MainBP [FC2]. This means that actual operator component data is available for subsequent program parts.

More information

Further information regarding the use and programming of "LBP_OpUnitComm [FB25000]" can be found in the SINUMERIK ONE PLC Function Manual.

8.24 Write data record to MCP LBP_OpUnitWriteRecord [FB25002]

The block writes a data record to a modular MCP. After the PLC migration, the "OpUnitWriteRecord [FC27]" (new from V4.94) must be adapted to the "LBP_OpUnitWriteRecord [FB25002]" (new from V6.14).

Procedure

To customize the FB calls in TIA Portal, proceed as follows:

1. Replace all obsolete calls in the user program with the new "LBP_OpUnitWriteRecord [FB25002]". The calls are normally only contained in the cyclic part of the user program.
2. Transfer the values of the previous parameters to the new FB.
3. Create an instance DB for "LBP_OpUnitComm [FB25000]" in the project.
4. Change the type of the following parameters from WORD to UINT.
   - MCPNum
   - SlotnUM
   - RecNum
5. Create an instance DB in the project for "LBP_OpUnitWriteRecord [FB25002]" (FC27 becomes FB25002).

8.25 Use of the "VARIANT" data type in the blocks of the basic program library

In the SINUMERIK ONE library, the use of the "ANY" data type has been replaced with the new "VARIANT" data type available for S7-1500 PLCs. This affects the **FB2**, **FB3**, **FB5** and **FB7** function blocks as well as the **FC21** function.

A significant advantage of the "VARIANT" data type is that data in optimized DBs can also be accessed. The availability of several new language elements for handling the "VARIANT" data type also simplifies the programming and is less error-prone.

"ANY" parameters do not need to be initialized, i.e. no value needs to be specified when calling a function block with "ANY" parameters. In the SINUMERIK 840D sl environment, the current value from the associated instance DB (which can also match the initial value) is used for uninitialized "ANY" parameters.

For the migration of the mentioned blocks, uninitialized previous "ANY" parameters are replaced automatically with the appropriate "VARIANT" parameter and initialized with "NULL". If this is not desired, the affected function calls must be adapted manually.

8.26 Completing the migration

To complete the migration, check whether all blocks have been converted and your project can be compiled.

In the Detail view of all program blocks (Page 71), search for all blocks of the "DummyLib" family. Such blocks are no longer supported. This affects, for example, the blocks FB29, FC5, FC22, FC1005, FC1006, ...

First check where these blocks are used and remove their use. Then delete the blocks.

See also

Renaming basic program blocks (Page 70)

Converting the safety functionality

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9.1 Activating Safety Integrated in the TIA Portal

Procedure

Proceed as follows to activate Safety Integrated (F-PLC):

1. Click the NCU in the network or device view and select the "Safety Integrated" entry in the "Properties > General" inspector window.
2. Click the "Change Safety Integrated mode" button.
   The "Change Safety Integrated mode" dialog opens. If you select an option, the effects of the mode change are performed here.
3. Select "SINUMERIK Safety Integrated (F-PLC)" and confirm the reconfiguration with "Yes".

Result

The Safety Integrated mode has been changed. The precise effects can be seen in the "Change Safety Integrated mode" dialog (step 2).

If problems occur during the changeover, you can find more information in the "Info > General" inspector window.

Note

Effects on telegram configuration

The Safety Integrated mode used affects the telegram configuration because, in the Safety Integrated (F-PLC) mode, different telegrams are used than when the Safety Integrated mode is inactive.

Telegrams that are added or changed are kept, however, as long as they are compatible with the newly selected Safety Integrated mode.

Make sure, if applicable, that any modifications are still present following the change of mode in the telegram configuration (Page 153).

As long as you have not saved the project, you can completely undo the change of the Safety Integrated mode by clicking "Undo" in the toolbar.

9.2 Licensing of axes/spindles and F-PLC

To use Safety Integrated, you require in addition to the license for SIMATIC STEP 7 Safety Advanced (TIA Portal), the appropriate software options for the RT function:

Table 9-1 Software options when using Safety Integrated

Software option	Article No.	Purpose
SINUMERIK ONE Safety Integrated - F-PLC	6FC5800-0BS60-0YB0	Activate the F-PLC in the SINUMERIK control system to process the failsafe sensors and actuators in an F-program.
SINUMERIK ONE Safety Integrated - axis/spindle	6FC5800-0BK00-0YB0	Use the motion control functions of the SINAMICS Integrated in the "SINUMERIK Safety Integrated (F-PLC)" mode. License for 1 axis/spindle, multiple licensing in order to be able to use additional axes/spindles.
SINUMERIK ONE Safety Integrated - multi axis packet	6FC5800-0BS61-0YB0	Use the motion control functions of the SINAMICS Integrated in the "SINUMERIK Safety Integrated (F-PLC)" mode. License for any number of axes/spindles.

Depending on the functions used, you must license the appropriate software options and set in the machine data:

- OD19500 $ON_SAFE_PLC_LOGIC: Safety Integrated basic option - F-PLC
- OD19121 $ON_NUM_DRIVEBASED_SAFE_AXES: Number of axes/spindles in the "SINUMERIK Safety Integrated (F-PLC)" mode

Additional licensing information:

You can find additional information about licensing in:

SINUMERIK ONE Commissioning Manual: Work steps for configuring and commissioning

9.3 Transition of Safety Integrated (SPL) to Safety Integrated (F-PLC)

9.3.1 Creating a safety program

Requirement

- Access to DB18 signals and to PLC-SPL code has been removed from the PLC program.
- The migration of the standard PLC program to a SINUMERIK ONE has been completed.

Basic procedure

The transfer or migration of a Safety Integrated (SPL) program to a Safety Integrated (F-PLC) safety program is not possible, because not only the program code, but also the locations or blocks from which the safety program can be called, differ greatly.

To use Safety Integrated (F-PLC), you must create a new safety program based on your existing safety concept or the risk analysis.

Programming of the safety program of Safety Integrated (F-PLC) for SINUMERIK ONE and of SINUMERIK Safety Integrated plus for the SINUMERIK 840D sl is comparable.

Further information

- *SIMATIC Safety Advanced* System Manual
- *SINUMERIK ONE Safety Integrated* Commissioning Manual

9.4 Adaptations to the safety program for migration from 840D sl to SINUMERIK ONE

9.4.1 Checking the calls of a migrated F-runtime group

In Safety Integrated (F-PLC) mode, a SINUMERIK ONE differs from a SINUMERIK 840D sl for the use of F-runtime groups.

Consequently, the calls of the F-runtime group of a SINUMERIK 840D sl are not migrated automatically. Check your PLC program or safety program for such calls and convert them to the new F-runtime group of the SINUMERIK ONE.

Completion of the migration and more detailed information

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The migration of the PLC is completed with the previous work steps.

In a further step, the HMI, NCK and drives must still be commissioned.

Further information

You can find information on the following topics in the SINUMERIK ONE documentation overview.

- Using and handling machine projects
- Archives in SINUMERIK Operate
- Safety functionality
- Upgrade
- Work steps for configuring and commissioning
- Functions

Appendix A

A

A.1 PLC basic program blocks

A.1.1 Migratable blocks of the PLC basic program

All blocks of the SINUMERIK basic PLC program transferred automatically during the PLC migration are listed below. Except for the following blocks, the migrated blocks after minor adaptations (such as changing symbolic names) are compatible with the basic PLC program V6.x: DB4 [DB4], DB15 [DB15], SPL [DB18], DB77 [DB77] and ALMSG_DB [DB2] in the variant "ExtendAlMsg=False". Although these blocks are transferred during the PLC migration, they are no longer part of the basic program. Accesses to these blocks must be deleted or possibly replaced with other blocks or operations.

Table A-1 Migratable data blocks (DB)

Address	Symbol in basic PLC program version		Remark
	Up to V4.9x	As of V6.x (SINUMERIK ONE)	
DB2	ALMSG_DB	--	*Variant without alarm extension* Can be migrated to SINUMERIK ONE, but is no longer supported in this variant. See: User alarm concept (DB2) (Page 36)
DB2	ALMSG_DB	LBP_AlarmMsgs	*Variant with alarm extension (1062 bytes or max. 6016 DB2 alarms)* Interface between user program and LBP_GenAlarmMsgs [FC10], contains bit arrays for blocking and stop signals as well as error and operating messages. See also: Interface DB of the PLC basic program (Page 142)
DB4	DB4	--	Can be migrated to SINUMERIK ONE, but the block is no longer supported and any user-defined adaptations must be transferred. See also: Transferring a user-defined message class configuration (error message / operating message) (Page 108), User alarm concept (DB2) (Page 36) The configuration data for tool management is no longer needed in this block. The basic PLC program receives this data via the internal NCK-PLC interface. See also: Magazine data from DB4 in the PLC program (Page 116)

Address	Symbol in basic PLC program version		Remark
	Up to V4.9x	**As of V6.x (SINUMERIK ONE)**	
DB5	DB5	LBP_ParamAlarmMsgs	Interface between user program and LBP_GenAlarmMsgs [FC10], contains the parameter assignment of the alarms for the bit fields in the LBP_AlarmMsgs [DB2] as error or operating message.
DB7	gp_par	LBP_ConfigData	As of V6.x, DB7 is a global DB. Except for some superfluous variables, it is compatible with the old instance DB. Contains parameters for the configuration and initialization of the basic program. See also: Comparison of symbolic identifiers for DB7 (Page 147)
DB8	DB8	LBP_InternalDB8	DB only for internal use in the basic program.
DB9	DB9	--	PLC compile cycles, the block is not part of basic PLC program V6.x or higher
DB10	NC	LBP_NC	Interface between user program and NC, contains signals from/to the NC, PLC and operating software. See also: Interface DB of the PLC basic program (Page 142) **Restriction** The offsets E_MCP1ready, E_MCP2ready, E_HTready, E_OP1KeyReady and E_OP2KeyReady (DBX104.0 ... DBX104.4) are only supplied for IE MCPs, but not for PN MCPs. HT and direct keys (OpKey) can generally only be connected via Ethernet. The diagnostic signals in byte 92 are not yet available. Information in this regard can be obtained in the TIA Portal help system using the keyword "Migration of RDSYSST operation".
DB11	Mode group	LBP_ModeGroup	Interface between user program and mode groups, contains signals from/to the NC and operating software. See also: Interface DB of the PLC basic program (Page 142)
DB15	DB15	--	General communication As of V6.x, the block is no longer part of the basic PLC program.
DB16	PI	LBP_PIServices	Interface for LBP_ReqPIService [FB7], contains definitions for all available PI services.
DB17	DB17	--	For identification of the control type. The block is no longer part of the basic PLC program as of V6.x
DB18	SPL	--	Safety Integrated data (SPL) Although transferred for the migration to SINUMERIK ONE, Safety Integrated (SPL) is no longer supported. See: Converting the safety functionality (Page 123)

Address	Symbol in basic PLC program version		Remark
	Up to V4.9x	As of V6.x (SINUMERIK ONE)	
DB19	MMC	LBP_HMI	Interface between user program and operator panel, contains signals from/to the operating software. See also: Interface DB of the PLC basic program (Page 142)
DB20	--	--	See also: Global DB or DB based on UDT (Page 56)
DB21...DB30	Chan1...Chan10	LBP_Chan1...LBP_Chan10	Interface between user program and channel, contains signals from/to the channel. See also: Interface DB of the PLC basic program (Page 142)
DB31...DB61	Axis1...Axis31	LBP_Axis1...LBP_Axis31	Interface between user program and axis/spindle, contains signals from/to axis/spindle. See also: Interface DB of the PLC basic program (Page 142)
DB71	TMLoadIF	LBP_TMLoad	Interface between user program and tool management, contains signals from/to Load/Unload magazine. See also: Interface DB of the PLC basic program (Page 142)
DB72	TMSpindleIF	LBP_TMSpindle	Interface between user program and tool management, contains signals for spindle as change position. See also: Interface DB of the PLC basic program (Page 142)
DB73	TMRevIF	LBP_TMTurret	Interface between user program and tool management, contains signals for turret. See also: Interface DB of the PLC basic program (Page 142)
DB74	--	--	The block is no longer part of the basic PLC program as of V6.x. Internal block which does not have to be migrated.
DB75	DB_MDec_List	LBP_MFuncDecListConfig	Decoding list for M decoding according to the list. Can be migrated to SINUMERIK ONE.
DB76	DB_M_Funktionen	LBP_MFuncDecListSignals	Signal list for M decoding according to the list. Can be migrated to SINUMERIK ONE.
DB77	DB77	--	Although transferred for the migration to SINUMERIK ONE, as of V6.x, DB77 is no longer part of the basic PLC program and is no longer supported.
DB78	PowerrideConfig	LBP_PowerrideConfig	Global data block containing two example configurations for a Powerride rotary/push switch using UDT78 and UDT79. See also: Integrating Powerride (Page 117)
DB1000	CtrlE	LBP_CtrlEnergy	Interface between user program and operating software, contains energy saving profiles for CtrlEnergy.
DB1001	SentronPac	LBP_SentronPac	Interface between user program and operating software, contains signals for SENTRON PAC energy monitoring devices. Is supported as of V6.22.

Address	Symbol in basic PLC program version		Remark
	Up to V4.9x	**As of V6.x (SINUMERIK ONE)**	
DB1002	ISM_TS	LBP_SpindleTempSensor	Interface between user program and operating software, contains signals for spindle temperature sensors.
DB1071	TMLoadIF_MT	LBP_TMLoadMT	Interface between user program and tool management, contains signals to Load/Unload magazine (multitool). See also: Interface DB of the PLC basic program (Page 142)
DB1072	TMSpindleIF_MT	LBP_TMSpindleMT	Interface between user program and tool management, contains signals for spindle as change position (multitool). See also: Interface DB of the PLC basic program (Page 142)
DB1073	TMRevIF_MT	LBP_TMTurretMT	Interface between user program and tool management, contains signals for turret (multitool). See also: Interface DB of the PLC basic program (Page 142)

Table A-2 Migratable organization blocks (OB)

Address	Symbol in basic PLC program version		Meaning
	Up to V4.9x	**As of V6.x (SINUMERIK ONE)**	
OB1	OB1	Main	Cyclic execution
OB40	OB40	Hardware interrupt	Hardware interrupt
OB82	OB82	Diagnostic error interrupt	Asynchronous error: Diagnostics alarm
OB86	OB86	Rack or station failure	Asynchronous error: Module failure
OB100	OB100	Startup	Restart

Table A-3 Migratable functions (FC) and function blocks (FB)

Address	Symbol in basic PLC program version		Functionality	Available in V6.21
	Up to V4.9x	**As of V6.x (SINUMERIK ONE)**		
FB29	Diagnostics	--	Diagnostic routines for the PLC user program with logging of signal states and signal changes.	In the TIA Portal, the system diagnostics provide this functionality. Consequently, as of V6.x, FB29 is no longer a direct part of the basic PLC program, but rather is now are available as sample application. An existing FB29 from the basic program ≤ V4.9x can be migrated to a SINUMERIK ONE and reused, provided the block is not know-how protected. See: Revoking know-how protection of type "KNOW_HOW_PROTECT" (Page 60)
FC12	FC12	LBP_CallBackAuxFunc	Call interface for users for auxiliary functions, the block is called on an event-driven basis in the basic program when new auxiliary functions are available.	Is migrated. Requires the internal LBP_InternalProc4[FC25003] block provided write-protected in the library.

A.1.2 Blocks of the PLC basic program that cannot be migrated (automatically)

All blocks of the SINUMERIK basic PLC program that are not migrated automatically to a SINUMERIK ONE are listed below. The blocks are available as new version for SINUMERIK ONE, except for PI_SERV [FB4], SI_Relay [FB10], SI_BrakeTest [FB11], Diagnostics [FB29], GP_DIAG [FC5], TM_DIR [FC22], FC1005 [FC1005] and FC1006 [FC1006], which are no longer supported.

Table A-4 Non-migratable function blocks (FBs)

Address	Symbol		Functionality	Available in V6.21	Blocks/ functions used
	Up to V4.9x	From V6.x (SINUMERIK ONE)			
FB1	RUN_UP	--	The block configures and initializes the basic program, starts synchronization between PLC and NCK, is called in the OB Startup [OB100] with instance DB LBP_InstConfig [DB7]. **Note:** The version identification can be found for FC1 at UserVersionString.	FB1 has been replaced with FC1, and is no longer part of the basic PLC program as of V6.x. See also FB1 and FC1 comparison (Page 139)	
FB2	GET	LBP_ReadVar	The block reads NC variables.	Available	FC25000 FC25001 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8
FB3	PUT	LBP_WriteVar	The block writes NC variables.	Available	FC25000 FC25001 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8
FB4	PI_SERV	--	The block starts PI services	No longer supported as of V6.x. Use LBP_ReqPIService [FB7] instead.	
FB5	GETGUD	LBP_ReadGUD	The block reads global user data (GUD) from the NC and determines the GUD variable address.	Available	FC25000 FC25001 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8

Address	Symbol		Functionality	Available in V6.21	Blocks/ functions used
	Up to V4.9x	From V6.x (SINUMERIK ONE)			
FB7	PI_SERV2	LBP_ReqPIService	The block starts PI services defined in the LBP_PIServices [DB16].	Available	FC25000 FC25001 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8 DB16
FB9	M2N	LBP_M2NSwitchOver	The block switches over control components (MCP/OP) connected with one or several control modules NCU; it uses the signals from LBP_HMI [DB19].	No longer supported as of V6.x. The MCP must be switched over in the user program. (See FB9 MCP switchover (Page 112))	
FB10	SI_Relais	--	Safety relay	Safety Integrated (SPL) is no longer supported. Block removed. See: Converting the safety functionality (Page 123)	
FB11	SI_BrakeTest	--	Brake test	Safety Integrated (SPL) is no longer supported. Block removed. See: Converting the safety functionality (Page 123)	
FB21	Powerride	LBP_Powerride	Block is used to control a Powerride rotary/push switch.	Available	(no dependencies)

Table A-5 Non-migratable functions (FC)

Address	Symbol		Functionality	Available in V6.21	Blocks/ functions used
	Up to V4.9x	**From V6.x (SINUMERIK ONE)**			
FC1	--	LBP_ConfigBP	The block configures and initializes the basic program, starts synchronization between PLC and NCK, is called in the OB Startup [OB100].	Available As of V6.x, FC1 replaces FB1 (≤ 4.9x). See also: Replacing the call of LBP_ConfigBP [FB1] in OB Startup [OB100] with LBP_ConfigBP [FC1] (Page 109)	FC25001 FC25004 FB1020 DB1020 DB7 DB8
FC2	GP_HP	LBP_MainBP	The block processes the cyclic part of the basic program, must be called at the start of Main [OB1]	Available	FC25001 FC25003 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8
FC3	GP_PRAL	LBP_NCKProcessIRT	The block processes the block-synchronous part of the basic program, must be called at the start of Hardware interrupt [OB40].	As of V6.x, FC3 is supported in hardware interrupt OBs. For this purpose, FC3, for example, must be called in OB40 at the beginning. Output parameters (formerly GP_* local data in OB40) are not yet supported in V6.x, this is possible as of V6.13. To obtain these output parameters, a variable of type "LBP_typeNCKProcessIRTFlags" must be created and transferred to the "Flags" parameter. See also: Supplementary conditions for calling LBP_NCKProcessIRT [FC3] in OB hardware interrupt [OB40] (Page 111)	FC25001 FC25003 FB1020 DB1020 DB2 DB3 DB5 DB8

Address	Symbol		Functionality	Available in V6.21	Blocks/ functions used
	Up to V4.9x	From V6.x (SINUMERIK ONE)			
FC5	GP_DIAG	--	The block records module disruptions and failures; it must be called at the beginning of the following OB: Diagnostic error interrupt [OB82], pull or plug of modules [OB 83], rack or station fault [OB86].	In the TIA Portal, the system diagnostics provide this functionality. FC5 is therefore no longer part of the basic PLC program as of V6.x.	
FC6	TM_TRANS2	LBP_TMTransferMT	The block transfers position and status information of the tools to the tool management interface in connection with Multitool.	Available	FC25001 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8
FC7	TM_REV	LBP_TMTransferTurret	The block acknowledges an implemented tool change of a turret to the tool management interface.	Available	FC25001 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8
FC8	TM_TRANS	LBP_TMTransfer	The block transfers position and status information of the tools to the tool management interface.	Available	FC25001 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8
FC9	ASUB	LBP_ReqASUP	The block starts asynchronous subprograms, the prerequisite is that it must be selected and parameterized by an NC program or by the LBP_ReqPIService [FB7] (PI service ASUP).	Available	FC25001 FC25004
FC10	AL_MSG	LBP_GenerateAlarmMsgs	The block evaluates the signals entered in LBP_AlarmMsgs [DB2], generates incoming and outgoing error and operating messages of the operating software and acknowledges error messages. Optionally, influencing of the block and stop signals can be performed.	Available	FB1020 DB1020 DB2 DB3 DB5 DB7

Address	Symbol		Functionality	Available in V6.21	Blocks/ functions used
	Up to V4.9x	From V6.x (SINUMERIK ONE)			
FC13	BHGDisp	LBP_HTCtrlHT2	Block carries out the display control of the handheld unit (HT 2).	Available	
FC17	YDelta	LBP_CtrlStarDelta	The block is used for star-delta changeover for digital main spindle drives.	Available	FC25004
FC18	SpinCtrl	LBP_CtrlAxisSpindle	The block controls axes and spindles from the user program.	Available	FC25001 FC25004
FC19	MCP_IFM	LBP_MCPCtrlMilling	The block transfers data from the machine control panel (MCP milling version) to the NC/PLC interface.	Available	FC25004 FB1020 DB1020 DB2 DB3 DB5 DB7 DB8 DB10 DB11
FC21	Transfer	LBP_TransferSelData	The block is used for high-speed data exchange between PLC and NCK.	Available	FC25001 FC25004 FB1020 DB1020 DB2 DB3 DB5 DB8
FC22	TM_DIR	--	The block provides the shortest path and direction of motion for positioning a tool magazine or turret (indexing axis).	As of V6.x, FC22 is no longer part of the basic PLC program and must be emulated in the user program.	
FC24	MCP_IFM2	LBP_MCPCtrlMillingSmall	The block transfers data from the machine control panel (MCP milling version compact) to the NC/PLC interface.	Available	FC25004
FC25	MCP_IFT	LBP_MCPCtrlTurning	The block transfers data from the machine control panel (MCP turning version) to the NC/PLC interface.	Available	FC25004
FC26	HPU_MCP	LBP_HTCtrlHT8	The block is used to transfer HT 8 data and HT 10 data to the NC/PLC interface.	Available	
FC27	OpUnitWriteRecord	LBP_OpUnitWriteRecord	The block writes a data set to a SINUMERIK ONE MCP.	Available	

Address	Symbol		Functionality	Available in V6.21	Blocks/ functions used
	Up to V4.9x	From V6.x (SINUMERIK ONE)			
FC1005	FC1005	--	Transfers data to the Ethernet CP.	FC1005 is no longer part of the basic PLC program as of V6.x. Instead, use the appropriate operations for "S7 communication" and "Open user communication" (task card "operations"). See also: Create MyVirtual Machine System Manual, Chapter "Restrictions for components, communication interfaces".	
FC1006	FC1006	--	Receives data from the Ethernet CP.	FC1006 is no longer part of the basic PLC program as of V6.x. Instead, use the appropriate operations for "S7 communication" and "Open user communication" (task card "operations"). See also: Create MyVirtual Machine System Manual, Chapter "Restrictions for components, communication interfaces".	

A.1.3 FB1 and FC1 comparison

FB1 has been replaced with FC1, and is no longer part of the basic PLC program as of V6.x.

Compared with FB1, FC1 has different input/output parameters, also with different names and types. The following figures provide an overview of the differences:

- Red: signal from FB1 absent for FC1
- Green: signal from FB1 renamed for FC1
- Blue: changed default

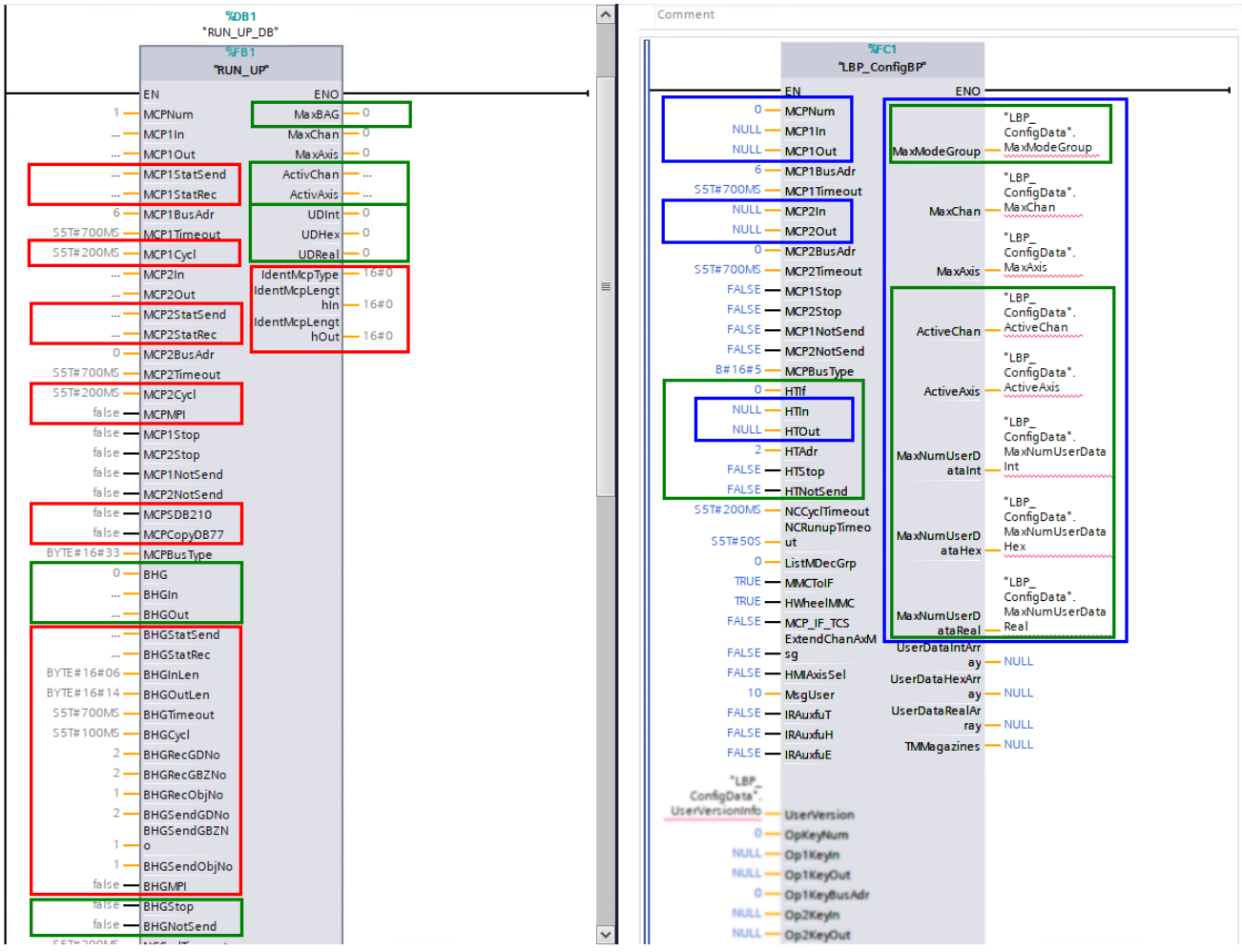


Figure A-1 Comparison of FB1 SINUMERIK 840D sl (left) and FC1 SINUMERIK ONE (right)

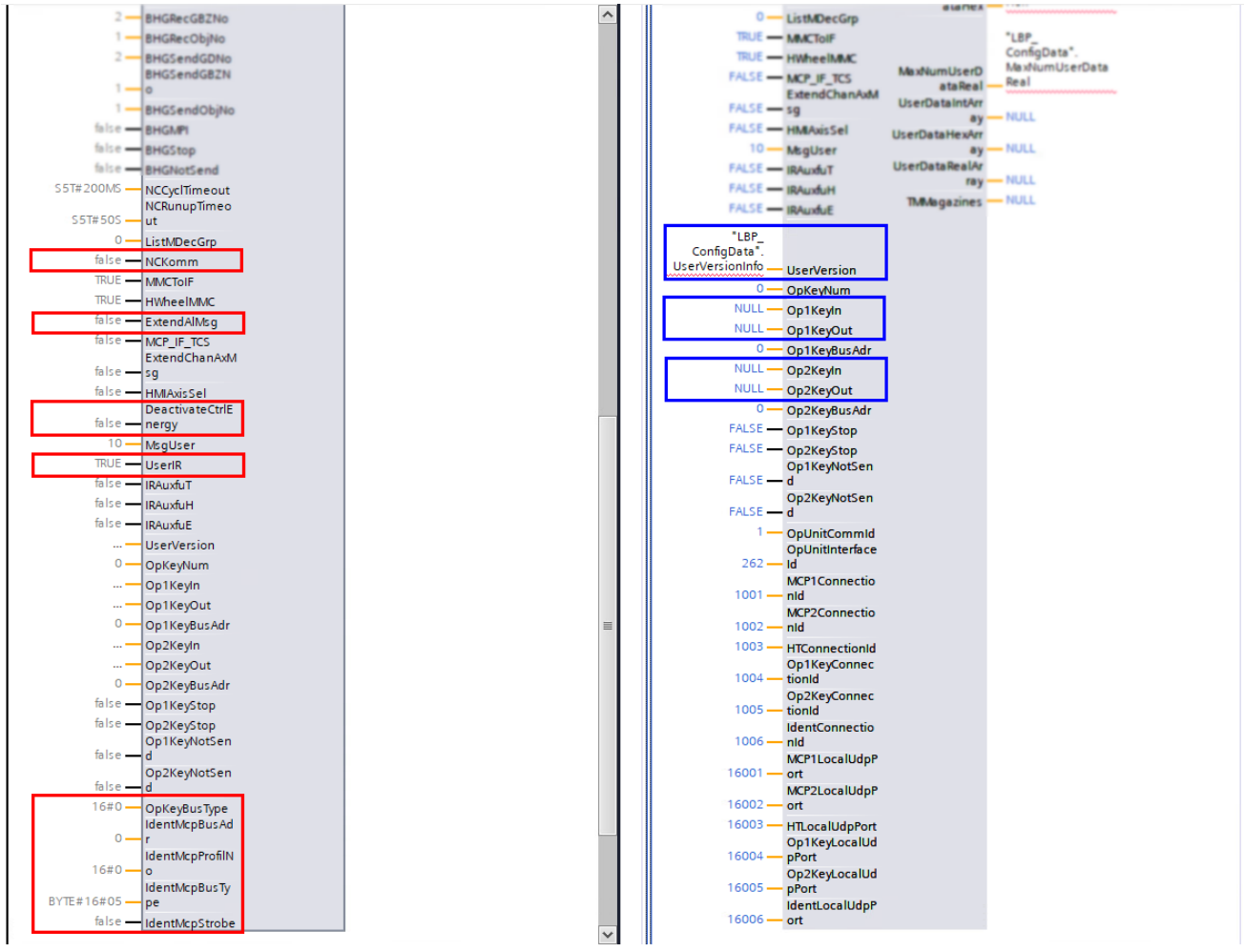


Figure A-2 Comparison of FB1 SINUMERIK 840D sl (left) and FC1 SINUMERIK ONE (right)

See also

Replacing the call of LBP_ConfigBP [FB1] in OB Startup [OB100] with LBP_ConfigBP [FC1] (Page 109)

Blocks of the PLC basic program that cannot be migrated (automatically) (Page 134)

A.1.4 Interface DB of the PLC basic program

The symbolic addressing requires that all project blocks used in the TIA Portal, including PLC interface data blocks of the basic program, must be defined in the project. The associated PLC data types (UDT) are available as copy templates.

Block	Symbolic block name		PLC data type	
	up to V4.90	as of V6.x (SINUMERIK ONE)	SINUMERIK 840D sl	SINUMERIK ONE
DB2	ALMSG_DB	LBP_AlarmMsgs	UDT1002 See also: User alarm concept (DB2) (Page 36)	LBP_type_AlarmMsgs
DB10	NC	LBP_NC	UDT10	LBP_typeNC
DB11	Mode group	LBP_ModeGroup	UDT11	LBP_typeModeGroup
DB19	MMC	LBP_HMI	UDT19	LBP_typeHMI
DB21...DB30	Chan1...Chan10	LBP_Chan1...LBP_Chan10	UDT21	LBP_typeChanX
DB31...DB61	Axis1...Axis31	LBP_Axis1...LBP_Axis31	UDT31	LBP_typeAxisX
DB71	TMLoadIF	LBP_TMLoad	UDT71	LBP_typeTMLoad
DB72	TMSpindleIF	LBP_TMSpindle	UDT72	LBP_typeTMSpindle
DB73	TMRevIF	LBP_TMTurret	UDT73	LBP_typeTMTurret
DB1071	TMLoadIF_MT	LBP_TMLoadMT	UDT1071	LBP_typeTMLoadMT
DB1072	TMSpindleIF_MT	LBP_TMSpindleMT	UDT1072	LBP_typeTMSpindleMT
DB1073	TMRevIF_MT	LBP_TMTurretMT	UDT1073	LBP_typeTMTurretMT

A.1.5 Comparison of the old and the new symbolics of the basic program blocks

To migrate a SINUMERIK 840D sl from a TIA Portal project to a SINUMERIK ONE, you must manually change the symbolic names of the basic PLC program blocks. The following table illustrates this.

Absolute address	Symbolic block name	
	SINUMERIK 840D sl	SINUMERIK ONE
FC2	GP_HP	LBP_MainBP
FC3	GP_PRAL	LBP_NCKProcessIRT
FC5	GP_DIAG	--
FC6	TM_TRANS2	LBP_TMTransferMT
FC7	TM_REV	LBP_TMTransferTurret
FC8	TM_TRANS	LBP_TMTransfer
FC9	ASUB	LBP_ReqASUP
FC10	AL_MSG	LBP_GenerateAlarmMsgs
FC12	FC12	LBP_CallBackAuxFunc
FC13	BHGDisp	LBP_HTCtrlHT2
FC17	YDelta	LBP_CtrlStarDelta
FC18	SpinCtrl	LBP_CtrlAxisSpindle
FC19	MCP_IFM	LBP_MCPCtrlMilling

Absolute address	Symbolic block name	
	SINUMERIK 840D sl	**SINUMERIK ONE**
FC21	Transfer	LBP_TransferSelData
FC22	TM_DIR	--
FC24	MCP_IFM2	LBP_MCPCtrlMillingSmall
FC25	MCP_IFT	LBP_MCPCtrlTurning
FC26	HPU_MCP	LBP_HTCtrlHT8
FB1 → FC1	RUN_UP	LBP_ConfigBP
FB2	GET	LBP_ReadVar
FB3	PUT	LBP_WriteVar
FB4	PI_SERV	--
FB5	GETGUD	LBP_ReadGUD
FB7	PI_SERV2	LBP_ReqPIService
FB9	M2N	LBP_M2NSwitchOver
FB21	Powerride	LBP_Powerride
FB29	Diagnostics	--
DB2	ALMSG_DB	LBP_AlarmMsgs
DB4	DB4	--
DB5	DB5	LBP_ParamAlarmMsgs
DB7	gp_par	LBP_ConfigData
DB8	DB8	LBP_InternalDB8
DB10	NC	LBP_NC
DB11	Mode group	LBP_ModeGroup
DB15	DB15	--
DB16	PI	LBP_PIServices
DB17	DB17	--
DB18	SPL	--
DB19	MMC	LBP_HMI
DB21	Chan1	LBP_Chan1
DB31	Axis1	LBP_Axis1
DB71	TMLoadIF	LBP_TMLoad
DB72	TMSpindleIF	LBP_TMSpindle
DB73	TMRevIF	LBP_TMTurret
DB75	DB_MDec_List	LBP_MFuncDecListConfig
DB76	DB_M_Funktionen	LBP_MFuncDecListSignals
DB77	DB77	--
DB78	PowerrideConfig	LBP_PowerrideConfig
DB1000	CtrlE	LBP_CtrlEnergy
DB1001	SentronPac	LBP_SentronPac
DB1002	ISM_TS	LBP_SpindleTempSensor
DB1071	TMLoadIF_MT	LBP_TMLoadMT
DB1072	TMSpindleIF_MT	LBP_TMSpindleMT
DB1073	TMRevIF_MT	LBP_TMTurretMT

A.2 Comparison of the addresses in DB2

The addresses of the two DB2 variants are compared below:

- DB2 without alarm extension (≤ V4.9x or 840D sl)
- DB2 with alarm extension (≤ V4.9x or 840D sl and V6.x or ONE)
  Note: DB2 with alarm extension (840D sl) differs from DB2 of the ONE by having a changed identifier. As of ONE, "ZInfo0" is called "AddValUserA0".

Table A-6 Comparison of the addresses in the DB2 variants

Alarm number	**DB2 without alarm extension**		**Offset**	**DB2 with alarm extension**	
	Area	**Offset**		**Offset**	**Area**
-				0	Chan (Channel 1 ... 10)
-				120	Axis (Axis/spindle 1 ... 31)
Additional value				182	as of V6.x: AddValUserA0 (AddValUserA0 0 ... 63) (Up to V4.8: ZInfo0 0 ... 63)
5C0000 ... 5C1315	(C1 ... C8) Channel 1 ... 8	Byte 0 ... <last byte for channel area>	**310**	Byte 310 ... <last byte for channel area>	ChanA Channel 1 ... 10
60AA00 ... 60AA15	(Axis areas) Axis/spindle 1 ... 18	Byte 144 ... <last byte for axis area>	**346**	Byte 490 ... <last byte for axis area>	AxisA Axis/spindle 1 ... 31
70UU00 ... 70UU63	(User area) User area 0 ... 31	Byte 180 ... <last byte for user area>	**374**	Byte 554 ... <last byte for user area>	UserA User area 0 ... 63

A.3 Comparison of symbolic identifiers for DB2 signals

In the user program, address a DB signal symbolically as follows:

"<symbolic name of the block>".<symbolic identifier of the signal>

This means a signal for DB2 is addressed differently depending on whether or not the symbolic name of the block has already been adapted:

- "ALMSG_DB".<symbolic identifier of the signal>
- "LBP_AlarmMsgs".<symbolic identifier of the signal>

Overview

The symbolic identifiers of the signal addresses for the two DB2 variants are compared below:

- DB2 without alarm extension (≤ V4.9x or 840D sl)
- DB2 with alarm extension (≤ V4.9x or 840D sl and V6.x or ONE)

For this purpose, the signals of the 3 signal areas (channel signals (Page 145), axis/spindle signals (Page 145), user area signals (Page 145)) are compared separately.

Note

DB2 with alarm extension for 840D sl and ONE: Changed ZInfo0 identifier

Note: DB2 with alarm extension (840D sl) differs from DB2 of the ONE by having a changed identifier. As of ONE, "ZInfo0" is called "AddValUserA0":

- If you convert from DB2 without alarm extension to DB2 with alarm extension, you do not need to make any additional adaptation, because AddValUserA0 or ZInfo0 is available only with the alarm extension.
- It you have already deployed DB2 with alarm extension on the 840D sl, you may need to convert the calls in your user program.

Comparison of the symbolic signal identifiers from the channel area (1 ... 8)

The symbolic identifiers of the signals in the channel area differ as follows:

DB2 without alarm extension	DB2 with alarm extension
C**j**.FDD_5**j**00xx[i]	ChanA[**j**].FDD_5C00xx[i]
C**j**.FDD_RID_5**j**01xx[i]	ChanA[**j**].FDD_RID_5C01xx[i]
C**j**.RID_5**j**02xx[i]	ChanA[**j**].RID_5C02xx[i]
C**j**.NCSD_5**j**03xx[i]	ChanA[**j**].NCSD_5C03xx[i]
C**j**.FdStop_1_5**j**11xx[i]	ChanA[**j**].FdStop_1_5C11xx[i]
C**j**.FdStop_2_5**j**12xx[i]	ChanA[**j**].FdStop_2_5C12xx[i]
C**j**.FdStop_3_5**j**13xx[i]	ChanA[**j**].FdStop_3_5C13xx[i]

j (shown bold): Insert the associated addressed channel number (1 ... 8)

Example for channel 1 (j = 1):

C1.FDD_5100xx[i]	ChanA[1].FDD_5C00xx[i]

Comparison of the symbolic signal identifiers from the axis/spindle area (1 ... 18)

The symbolic identifiers of the signals in the axis/spindle area differ as follows:

DB2 without alarm extension	DB2 with alarm extension
_**j**FdStop600**j**xx[i]	AxisA[**j**].AAFdStop60AAxx[i]
_**jj**FdStop60**jj**xx[i]	AxisA[**jj**].AAFdStop60AAxx[i]

j or **jj** (shown bold): Insert the associated axis/spindle number (1 ... 9 or 10 ... 18)

Comparison of the symbolic signal identifiers from the user area (00 ... 31)

The symbolic identifiers of the signals in the user area differ as follows:

DB2 without alarm extension	DB2 with alarm extension
A70**jj**xx[i]	UserA[**jj**].A70UUxx[i]

jj (shown bold): Insert the associated address user area (00 ... 31)

A.4 Comparison of symbolic identifiers for DB7

The following table shows the symbolic differences between the old instance DB7 and the new global DB7. Symbols not listed here have not been changed. In general, the meaning of the values has not changed and the offsets within DB7 are also unchanged.

DB7 symbol 840D sl	DB7 symbol ONE	Offset
MCP1StatSend	reservedByte14_25	14.0
MCP1StatRec		20.0
MCP1Cycl	reservedByte30_31	30.0
MCP2StatSend	reservedByte44_55	44.0
MCP2StatRec		50.0
MCP2Cycl	reservedByte60_61	60.0
MCPMPI	reservedBool62_0	62.0
MCPSDB210	reservedBool62_5	62.5
MCPCopyDB77	reservedBool62_6	62.6
BHG	HTIf	64.0
BHGIn	HTIn	66.0
BHGOut	HTOut	72.0
BHGStatSend	reservedByte78_95	78.0
BHGStatRec		84.0
BHGInLen		90.0
BHGOutLen		91.0
BHGTimeout		92.0
BHGCycl		94.0

BHGRecGDNo	HTAdr	96.0
BHGRecGBZNo	reservedByte98_107	98.0
BHGRecObjNo		100.0
BHGSendGDNo		102.0
BHGSendGBZNo		104.0
BHGSendObjNo		106.0
BHGMPI	reservedBool108_0	108.0
BHGStop	HTStop	108.1
BHGNotSend	HTNotSend	108.2
NCKomm	reservedBool116_0	116.0
ExtendAlMsg	reservedBool116_3	116.3
UserIR	reservedBool120_0	120.0
OpKeyBusType	reservedByte159	159.0
MaxBAG	MaxModeGroup	166.0
ActivChan	ActiveChan	172.0
ActivAxis	ActiveAxis	174.0
UDInt	MaxNumUserDataInt	178.0
UDHex	MaxNumUserDataHex	180.0
UDReal	MaxNumUserDataReal	182.0
MCP1_Poi	reservedByte188_199	188.0
MCP2_Poi		192.0
BHG_Poi		196.0

GPVersion	BPVersion	200.0
-	UserVersionString	246.0

See also

Replacing the call of LBP_ConfigBP [FB1] in OB Startup [OB100] with LBP_ConfigBP [FC1] (Page 109)

A.5 Migration log and compilation messages

The migration log, the messages from the compilation and the tables in this chapter help you with assessing the migration result.

These messages are separated into errors and warnings. Errors must always be rectified so that the program can be compiled and can run. Warnings must be checked individually to determine whether they lead to problems.

Check in which step of the migration process an error can be rectified easiest:

- In STEP 7 V5.5 SP4:
  Many problems can be rectified easier in STEP 7 V5.5 SP4 before you migrate the project to the TIA Portal, e.g. because of the changed operand priority (absolute/symbolic).
- In the TIA Portal on the SINUMERIK 840D sl project
- After PLC migration to the SINUMERIK ONE

A.5.1 Frequent errors/warnings during migration

Table A-7 Migration log: Frequent errors and warnings

Error/warning	Remark	Removal
The following blocks could not be migrated (error)	If this error lists only blocks of the PLC program that cannot be migrated (automatically) (Page 134), you should check whether they have been converted correctly to dummy blocks.	After migration
	If blocks of your PLC user program could not be migrated, remove the know-how protection and repeat the migration.	On the starting project
	If blocks from other manufacturers or option packages are listed, check whether they are available for the TIA Portal.	Refer to the documentation of the associated manufacturer or option package
The block contains operations that address hardware modules. Specify the hardware ID of the new modules. (Error)	The SINUMERIK ONE uses symbolic hardware identifications (HWID) rather than the previous diagnostic addresses. The hardware identifications of a module can be found in its properties at "System constants". Replace the hardware identifications in the associated parameters and operations (e.g. LADDR, ID, D_ACT_DP, DPRD_DAT, DPWR_DAT, GADR_LGC). See also: TIA Portal online help, search term "Help for the PLC migration:22"	After PLC migration and the interconnection of the hardware (Page 83)
The partially qualified address cannot be converted to a fully qualified address. (Error)	When addressing a DB variable in the user program, no symbolic name could be augmented. Absolute (partially qualified) access to the variable is still made in the migrated user program. Even when no error is displayed in the block editor, this must be checked and rectified appropriately. See also: TIA Portal online help, search term "Help for the PLC migration:5"	On the starting project or after migration

Error/warning	Remark	Removal
The "EN" and "ENO" parameters may not be interconnected when calling the TON/TOF function. (Warning)	S7-1500 and SINUMERIK ONE no longer support this procedure. Adapt the operation. See: TIA Portal online help, search term "Help for the PLC migration:6"	After PLC migration
The following operations called in the program are no longer supported by the S7-1500: 'WR_USMSG' (Error)	The S7-1500 does not have any generally-valid replacement for the WR_USMSG. See also: TIA Portal online help, search term "SINUMERIK user alarm" **Note:** You can make diagnostic buffer entries with the "Gen_UsrMsg" command.	After PLC migration

A.5.2 Frequent compilation messages

Table A-8 Compiling the software after migration: Frequent errors/warnings

Error/warning	Remark	Removal
The called block DBxy in network x does not exist. (Warning)	To access signals of a data block, it must exist in the TIA Portal project. See: Addressing a DB that does not exist in the project (Page 40)	On the starting project
• 'LBP_DB2AlarmTypeErrMsg' contains invalid text" • The 'LBP_DB2AlarmTypeOpMsg' message contains invalid text" • The 'LBP_DB2AlarmTypeInfoMsg' message contains invalid text" • The 'LBP_UserAlarmTypeErrMsg' message contains invalid text" • 'LBP_UserAlarmTypeOpMsg' contains invalid text" • 'LBP_UserAlarmTypeInfoMsg' contains invalid text" • 'LBP_UserAlarmTypeAckMsg' contains invalid text" (Warnings)	These warnings are displayed when you use DB2 alarms in the user program without importing the DB2 alarm texts from SINUMERIK Operate into the TIA Portal. Importing DB2 alarm texts is optional. If DB2 alarm texts are not imported, you can display them only in SINUMERIK Operate, but not in the TIA Portal, via the Web server of the PLC or via Get_Alarm [FB702]. See: TIA Portal online help, search term "Importing DB2 alarms"	After PLC migration
The variable 'abc' is declared as Output, and cannot be read. (Warning) The variable 'xyz' is declared as Input, and cannot be written. (Warning)	Writing input parameters or reading output parameters is no longer possible. • If the modification of the input parameter or the read-back of the output parameter should be retained, you can use InOut parameters. • Otherwise use temporary variables that are initialized explicitly. See: TIA Portal online help, search term "Pass parameter as copy or pointer"	On the starting project

Error/warning	Remark	Removal
The address is not occupied by a variable. (Warning)	The reason for this warning is often an access of the following type to an address of a DB: For example, absolute access to an address area of 2 bytes where the individual bytes have symbolic names, but not the 2-byte Word. When you rectify such problems before the migration, automatic addressing can be converted to symbolic addressing.	On the starting project
The element is not supported in this language version. (Error)	Relates to programming procedures that are no longer supported with S7-1500 and SINUMERIK ONE. Check the associated error for the network and the block in the migration log.	After PLC migration
The referenced "xyz" block no longer exists. (Error)	See Frequent errors/warnings during migration (Page 150), error "The following blocks could not be migrated"	See there
The "<block name>" data type no longer exists. (Error)		
The called "abc" block in network "xyz" does not exist. (Error)		
The data type x of the actual parameter does not match the data type y of the formal parameter. (Error)	Data type conflict that can result for the automatic conversion of the user program to symbolic addressing. Ideally, adapt the user program before the migration. Alternatively, you can correct the data type of the named parameter in the block editor after the migration. See: Checking the user program for required adaptations (Page 63)	On the starting project

A.6 Standard telegram configuration of a SINUMERIK ONE

A.6.1 SINUMERIK-conformal telegram configuring

Rules for SINUMERIK-conformal telegram configuring of SINAMICS drives

To configure the data exchange between a SINUMERIK 828D, SINUMERIK ONE or SINUMERIK MC and SINAMICS S120 drives, the following rules must be observed for the PROFIBUS/PROFINET configuration of the drives:

- For SINAMICS drive devices (CU3xx) on PROFIBUS/PROFINET, the PROFIBUS/PROFINET configuration must be identical to the standard configuration of the telegrams of the drives on the integrated PROFIBUS (SINAMICS Integrated or NX) of a SINUMERIK 828D or SINUMERIK ONE with regard to the telegrams structure.
- The identical structure of the telegrams refers specifically to the sequence of telegrams for a drive (CU3xx). The telegrams must be configured in the following order:
  - Telegrams for SERVO or HLA drive objects
  - Telegram for the Control Unit drive object
  - Telegram for the infeed drive object
- The following rules must be observed for the telegrams of the individual drive objects:
  - The input and output address of a telegram must have the same value.
    Exception: User-specific telegrams that only have input or output values.
  - The input and output data of a telegram are generally transferred via the same slot. If two different slots are used for data exchange (for PROFIBUS or PROFIBUS Integrated), make sure that the input slot is defined first. The output slot must have the following slot number.

A.6.2 PROFIdrive telegrams for standard data

The following tables contain the I/O addresses of standard telegrams.

Table A-9 SINAMICS Integrated: I/O addresses of PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis01	SIEMENS telegram 136	4100	13050[0]	13060[0]
DriveAxis02	SIEMENS telegram 136	4140	13050[1]	13060[1]
DriveAxis03	SIEMENS telegram 136	4180	13050[2]	13060[2]
DriveAxis04	SIEMENS telegram 136	4220	13050[3]	13060[3]
DriveAxis05	SIEMENS telegram 136	4260	13050[4]	13060[4]
DriveAxis06	SIEMENS telegram 136	4300	13050[5]	13060[5]
DriveCU01	SIEMENS telegram 391	6500	13120[0]	-
Infeed01	SIEMENS telegram 370	6514	-	-

Table A-10 NX on DRIVE-CLiQ socket X105; DP address 15: I/O addresses of PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis07	SIEMENS telegram 136	4340	13050[6]	13060[6]
DriveAxis08	SIEMENS telegram 136	4380	13050[7]	13060[7]
DriveAxis09	SIEMENS telegram 136	4420	13050[8]	13060[8]
DriveAxis10	SIEMENS telegram 136	4460	13050[9]	13060[9]
DriveAxis11	SIEMENS telegram 136	4500	13050[10]	13060[10]
DriveAxis12	SIEMENS telegram 136	4540	13050[11]	13060[11]
DriveCU02	SIEMENS telegram 390	6530	-	-
Infeed02	SIEMENS telegram 370	6534	-	-

Table A-11 NX on DRIVE-CLiQ socket X104; DP address 14: I/O addresses of PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis13	SIEMENS telegram 136	4580	13050[12]	13060[12]
DriveAxis14	SIEMENS telegram 136	4620	13050[13]	13060[13]
DriveAxis15	SIEMENS telegram 136	4660	13050[14]	13060[14]
DriveAxis16	SIEMENS telegram 136	4700	13050[15]	13060[15]
DriveAxis17	SIEMENS telegram 136	4740	13050[16]	13060[16]
DriveAxis18	SIEMENS telegram 136	4780	13050[17]	13060[17]
DriveCU03	SIEMENS telegram 390	6540	-	-
Infeed03	SIEMENS telegram 370	6544	-	-

Table A-12 NX on DRIVE-CLiQ socket X103; DP address 13: I/O addresses of PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis19	SIEMENS telegram 136	4820	13050[18]	13060[18]
DriveAxis20	SIEMENS telegram 136	4860	13050[19]	13060[19]
DriveAxis21	SIEMENS telegram 136	4900	13050[20]	13060[20]
DriveAxis22	SIEMENS telegram 136	4940	13050[21]	13060[21]
DriveAxis23	SIEMENS telegram 136	4980	13050[22]	13060[22]
DriveAxis24	SIEMENS telegram 136	5020	13050[23]	13060[23]
DriveCU04	SIEMENS telegram 390	6550	-	-
Infeed04	SIEMENS telegram 370	6554	-	-

Table A-13 NX on DRIVE-CLiQ socket X102; DP address 12: I/O addresses of PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis25	SIEMENS telegram 136	5060	13050[24]	13060[24]
DriveAxis26	SIEMENS telegram 136	5100	13050[25]	13060[25]
DriveAxis27	SIEMENS telegram 136	5140	13050[26]	13060[26]
DriveAxis28	SIEMENS telegram 136	5180	13050[27]	13060[27]
DriveAxis29	SIEMENS telegram 136	5220	13050[28]	13060[28]
DriveAxis30	SIEMENS telegram 136	5260	13050[29]	13060[29]
DriveCU05	SIEMENS telegram 390	6560	-	-
Infeed05	SIEMENS telegram 370	6564	-	-

Table A-14 NX on DRIVE-CLiQ socket X101; DP address 11: I/O addresses of PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis31	SIEMENS telegram 136	5300	13050[30]	13060[30]
DriveAxis32	SIEMENS telegram 136	5340	-	-
DriveAxis33	SIEMENS telegram 136	5380	-	-
DriveAxis34	SIEMENS telegram 136	5420	-	-
DriveAxis35	SIEMENS telegram 136	5460	-	-
DriveAxis36	SIEMENS telegram 136	5500	-	-
DriveCU06	SIEMENS telegram 390	6570	-	-
Infeed06	SIEMENS telegram 370	6574	-	-

Table A-15 NX on DRIVE-CLiQ socket X100; DP address 10: I/O addresses of PROFIdrive telegrams

Drive	Telegram type	I/O address
DriveAxis37	SIEMENS telegram 136	5540
DriveAxis38	SIEMENS telegram 136	5580
DriveAxis39	SIEMENS telegram 136	5620
DriveAxis40	SIEMENS telegram 136	5660
DriveAxis41	SIEMENS telegram 136	5700
DriveAxis42	SIEMENS telegram 136	5740
DriveCU07	SIEMENS telegram 390	6580
Infeed07	SIEMENS telegram 370	6584

A.6.3 PROFIsafe/PROFIdrive telegrams for Safety Integrated (F-PLC)

The following tables contain the I/O addresses of safety-relevant telegrams.

From the firmware versions of SINUMERIK ONE, the I/O addresses of SIEMENS telegram 903 no longer have to be entered in the machine data.

Table A-16 SINAMICS Integrated: I/O addresses of PROFIsafe/PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis01	SIEMENS telegram 903	6700	-	-
DriveAxis01	SIEMENS telegram 701	5800	13374[0]	13376[0]
DriveAxis02	SIEMENS telegram 903	6716	-	-
DriveAxis02	SIEMENS telegram 701	5816	13374[1]	13376[1]
DriveAxis03	SIEMENS telegram 903	6732	-	-
DriveAxis03	SIEMENS telegram 701	5832	13374[2]	13376[2]
DriveAxis04	SIEMENS telegram 903	6748	-	-
DriveAxis04	SIEMENS telegram 701	5848	13374[3]	13376[3]
DriveAxis05	SIEMENS telegram 903	6764	-	-
DriveAxis05	SIEMENS telegram 701	5864	13374[4]	13376[4]
DriveAxis06	SIEMENS telegram 903	6780	-	-
DriveAxis06	SIEMENS telegram 701	5880	13374[5]	13376[5]

Table A-17 NX on DRIVE-CLiQ socket X105; DP address 15: I/O addresses of PROFIsafe/PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis07	SIEMENS telegram 903	6796	-	-
DriveAxis07	SIEMENS telegram 701	5896	13374[6]	13376[6]
DriveAxis08	SIEMENS telegram 903	6812	-	-
DriveAxis08	SIEMENS telegram 701	5912	13374[7]	13376[7]
DriveAxis09	SIEMENS telegram 903	6828	-	-
DriveAxis09	SIEMENS telegram 701	5928	13374[8]	13376[8]
DriveAxis10	SIEMENS telegram 903	6844	-	-
DriveAxis10	SIEMENS telegram 701	5944	13374[9]	13376[9]
DriveAxis11	SIEMENS telegram 903	6860	-	-
DriveAxis11	SIEMENS telegram 701	5960	13374[10]	13376[10]
DriveAxis12	SIEMENS telegram 903	6876	-	-
DriveAxis12	SIEMENS telegram 701	5976	13374[11]	13376[11]

Table A-18 NX on DRIVE-CLiQ socket X104; DP address 14: I/O addresses of PROFIsafe/PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis13	SIEMENS telegram 903	6892	-	-
DriveAxis13	SIEMENS telegram 701	5992	13374[12]	13376[12]
DriveAxis14	SIEMENS telegram 903	6908	-	-
DriveAxis14	SIEMENS telegram 701	6008	13374[13]	13376[13]
DriveAxis15	SIEMENS telegram 903	6924	-	-
DriveAxis15	SIEMENS telegram 701	6024	13374[14]	13376[14]
DriveAxis16	SIEMENS telegram 903	6940	-	-
DriveAxis16	SIEMENS telegram 701	6040	13374[15]	13376[15]
DriveAxis17	SIEMENS telegram 903	6956	-	-
DriveAxis17	SIEMENS telegram 701	6056	13374[16]	13376[16]
DriveAxis18	SIEMENS telegram 903	6972	-	-
DriveAxis18	SIEMENS telegram 701	6072	13374[17]	13376[17]

Table A-19 NX on DRIVE-CLiQ socket X103; DP address 13: I/O addresses of PROFIsafe/PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis19	SIEMENS telegram 903	6988	-	-
DriveAxis19	SIEMENS telegram 701	6088	13374[18]	13376[18]
DriveAxis20	SIEMENS telegram 903	7004	-	-
DriveAxis20	SIEMENS telegram 701	6104	13374[19]	13376[19]
DriveAxis21	SIEMENS telegram 903	7020	-	-
DriveAxis21	SIEMENS telegram 701	6120	13374[20]	13376[20]
DriveAxis22	SIEMENS telegram 903	7036	-	-
DriveAxis22	SIEMENS telegram 701	6136	13374[21]	13376[21]
DriveAxis23	SIEMENS telegram 903	7052	-	-
DriveAxis23	SIEMENS telegram 701	6152	13374[22]	13376[22]
DriveAxis24	SIEMENS telegram 903	7068	-	-
DriveAxis24	SIEMENS telegram 701	6168	13374[23]	13376[23]

Table A-20 NX on DRIVE-CLiQ socket X102; DP address 12: I/O addresses of PROFIsafe/PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis25	SIEMENS telegram 903	7084	-	-
DriveAxis25	SIEMENS telegram 701	6184	13374[24]	13376[24]
DriveAxis26	SIEMENS telegram 903	7100	-	-
DriveAxis26	SIEMENS telegram 701	6200	13374[25]	13376[25]
DriveAxis27	SIEMENS telegram 903	7116	-	-
DriveAxis27	SIEMENS telegram 701	6216	13374[26]	13376[26]
DriveAxis28	SIEMENS telegram 903	7132	-	-
DriveAxis28	SIEMENS telegram 701	6232	13374[27]	13376[27]
DriveAxis29	SIEMENS telegram 903	7148	-	-
DriveAxis29	SIEMENS telegram 701	6248	13374[28]	13376[28]
DriveAxis30	SIEMENS telegram 903	7164	-	-
DriveAxis30	SIEMENS telegram 701	6264	13374[29]	13376[29]

Table A-21 NX on DRIVE-CLiQ socket X101; DP address 11: I/O addresses of PROFIsafe/PROFIdrive telegrams

Drive	Telegram type	I/O address	MD for I/O address	MD for telegram type
DriveAxis31	SIEMENS telegram 903	7180	-	-
DriveAxis31	SIEMENS telegram 701	6280	13374[30]	13376[30]
DriveAxis32	SIEMENS telegram 903	7196	-	-
DriveAxis32	SIEMENS telegram 701	6296	-	-
DriveAxis33	SIEMENS telegram 903	7212	-	-
DriveAxis33	SIEMENS telegram 701	6312	-	-
DriveAxis34	SIEMENS telegram 903	7228	-	-
DriveAxis34	SIEMENS telegram 701	6328	-	-
DriveAxis35	SIEMENS telegram 903	7244	-	-
DriveAxis35	SIEMENS telegram 701	6344	-	-
DriveAxis36	SIEMENS telegram 903	7260	-	-
DriveAxis36	SIEMENS telegram 701	6360	-	-

Table A-22 NX on DRIVE-CLiQ socket X100; DP address 10: I/O addresses of PROFIsafe/PROFIdrive telegrams

Drive	Telegram type	I/O address
DriveAxis37	SIEMENS telegram 903	7276
DriveAxis37	SIEMENS telegram 701	6376

Drive	Telegram type	I/O address
DriveAxis38	SIEMENS telegram 903	7292
DriveAxis38	SIEMENS telegram 701	6392
DriveAxis39	SIEMENS telegram 903	7308
DriveAxis39	SIEMENS telegram 701	6408
DriveAxis40	SIEMENS telegram 903	7324
DriveAxis40	SIEMENS telegram 701	6424
DriveAxis41	SIEMENS telegram 903	7340
DriveAxis41	SIEMENS telegram 701	6440
DriveAxis42	SIEMENS telegram 903	7356
DriveAxis42	SIEMENS telegram 701	6456

A.7 Communication interfaces

Interfaces of a SINUMERIK ONE

SINUMERIK ONE uses PLC, CP and CM communication mechanisms based on the S7-1500 product family, and therefore has different interfaces than a SINUMERIK 840D sl.

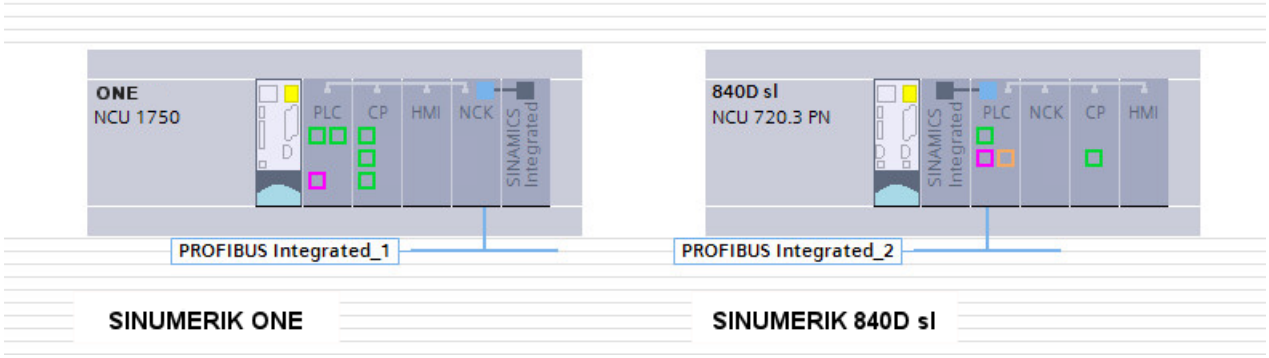


Figure A-3 Comparison of the configuration (network view): SINUMERIK ONE and SINUMERIK 840D sl

	Interface	Type	ONE	840D sl
	Internal	PROFIBUS DP Integrated	x	x
	X120/X130, X127	Ethernet, PN-IE interfaces	x (individually configurable)	x (not configurable)
	X126	PROFIBUS DP	x	x
	X136	MPI/DP	-	x
	X150	PROFINET IO	x	x
	X160	PROFINET IO	x	-

A.8 Differences of NCU communication mechanisms

Support of NCU communications interfaces

The NCU communication interfaces (of CP/CM, PLC) are based on the related SIMATIC communication modules and mechanisms. New features and changes to the communication mechanisms, which are relevant when migrating from an S7-300 to an S7-1500, are also relevant when migrating from SINUMERIK 840D sl to SINUMERIK ONE, for example:

- PROFINET CBA is not supported
- Alarms are processed differently (alarm S/SQ is not supported)
  An extension or a substitute for associated values is provided with S7-1500 (max. 10 associated values possible) by using the alarm block Program_Alarm.
- System status queries are handled differently (no SSL)

The information in this manual is only intended as entry-level information and describes the special features of SINUMERIK. In addition to the information here, the information in the appropriate SIMATIC manuals applies:

- CPU-CPU Communication with SIMATIC Controllers Compendium (https://support.industry.siemens.com/cs/document/78028908/)
- SIMATIC NET S7-1500 Industrial Ethernet CP1543-1 Manual (https://support.industry.siemens.com/cs/document/76476576/)
- Guidelines for Migrating from SIMATIC S7-300/400 to SIMATIC S7-1500 and the TIA Portal (https://support.industry.siemens.com/cs/document/109478811/)

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