



APPLICATION EXAMPLE

SIMATIC S7-1200 G2 Migration Guideline

Support for Project migration SIMATIC S7-1200 Generation 2



Legal information

Use of application examples

Application examples illustrate the solution of automation tasks through an interaction of several components in the form of text, graphics and/or software modules. The application examples are a free service by Siemens AG and/or a subsidiary of Siemens AG ("Siemens"). They are non-binding and make no claim to completeness or functionality regarding configuration and equipment. The application examples merely offer help with typical tasks; they do not constitute customer-specific solutions. The application examples are not subject to standard tests and quality inspections of a chargeable product and may contain functional and performance defects or other faults and security vulnerabilities. You are responsible for the proper and safe operation of the products in accordance with all applicable regulations, including checking and customizing the application example for your system, and ensuring that only trained personnel use it in a way that prevents property damage or injury to persons. You are solely responsible for any productive use.

Siemens grants you the non-exclusive, non-sublicensable and non-transferable right to have the application examples used by technically trained personnel. Any change to the application examples is your responsibility. Sharing the application examples with third parties or copying the application examples or excerpts thereof is permitted only in combination with your own products. Any further use of the application examples is explicitly not permitted and further rights are not granted. You are not allowed to use application examples in any other way, including, without limitation, for any direct or indirect training or enhancements of Al models.

Disclaimer of liability

Siemens shall not assume any liability, for any legal reason whatsoever, including, without limitation, liability for the usability, availability, completeness and freedom from defects of the application examples as well as for related information, configuration and performance data and any damage caused thereby. This shall not apply in cases of mandatory liability, for example under the German Product Liability Act, or in cases of intent, gross negligence, or culpable loss of life, bodily injury or damage to health, non-compliance with a guarantee, fraudulent non-disclosure of a defect, or culpable breach of material contractual obligations. Claims for damages arising from a breach of material contractual obligations shall however be limited to the foreseeable damage typical of the type of agreement, unless liability arises from intent or gross negligence or is based on loss of life, bodily injury or damage to health. The foregoing provisions do not imply any change in the burden of proof to your detriment. You shall indemnify Siemens against existing or future claims of third parties in this connection except where Siemens is mandatorily liable.

By using the application examples you acknowledge that Siemens cannot be held liable for any damage beyond the liability provisions described.

Other information

Siemens reserves the right to make changes to the application examples at any time without notice and to terminate your use of the application examples at any time. In case of discrepancies between the suggestions in the application examples and other Siemens publications such as catalogs, the content of the other documentation shall have precedence.

The Siemens terms of use (https://www.siemens.com/global/en/general/terms-of-use.html) shall also apply.

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 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://www.siemens.com/cert.

Table of contents

1.	Introduction	5
1.1.	Overview	5
1.2.	Preliminary Information	5
1.2.1.	Motivations for switching to S7-1200 Generation 2	5
1.2.2.	S7-1200 G2 Instruction speed execution	6
1.2.3.	Hardware	6
1.2.4.	Software	7
2.	Pre-migration	8
2.1.	Differences between S7-1200 and S7-1200 G2	8
2.2.	Pre-Migration preparation Hardware	9
2.2.1.	Dimensional differences	9
2.2.2.	Wiring	12
2.2.3.	IO Modules in higher temperature than maximum ambient conditions	12
2.2.4.	Differential Inputs	14
2.2.5.	Checking Hardware compatibility	14
2.3.	Pre-Migration preparation for Software	14
2.3.1.	Backing up the S7-1200 Project	14
2.3.2.	Checking Software compatibility	14
2.3.3.	Updating TIA Portal to the latest version (V20)	14
2.3.4.	Motion Control	14
2.3.5.	Supported Instructions	15
2.3.6.	Supported Technology Objects	15
2.3.7.	Supported OBs	16
3.	Migration Checker and Migration Tool	17
3.1.	Migration Checker	17
3.2.	SIMATIC S7-1200 G2 Migration Tool Add-In	17
3.3.	Migration reports	18
4.	Post-migration manual procedure	19
4.1.	Not available Hardware / Hardware alternatives	19
4.2.	Hardware properties	21
4.3.	Software	23
4.3.1.	PLC Tags - System and clock memory	23
4.3.2.	Copy Protection	24
4.3.3.	Control Highspeed Counter	25
4.3.4.	Web server configuration of S7-1200	26
4.4.	Technology Objects & Motion Control	27
4.4.1.	TOs for PID Controller	28

		Table of contents
4.4.2.	MC_Blocks	28
4.5.	HMI connections / tags	29
4.5.1.	Creating new HMI connection for target PLC	29
4.5.2.	Updating Tag table content	30
4.6.	Security Settings	30
4.7.	Transfer Watch, Force and Trace Tables Manually	30
5.	Appendix	33
5.1.	Service and support	33
5.2.	Links and literature	34
5.3	Change documentation	34

1. Introduction

1.1. Overview

The second generation of Siemens SIMATIC S7-1200 PLCs represents a new family of programmable logic controllers developed in conjunction with the latest version of TIA Portal V20. This new generation was designed to provide customers with a technologically superior and cost-effective solution that meets the demands for advanced technology and stringent security in the industrial sector. SIMATIC S7-1200 Generation 2 PLCs offer a more efficient and economical option that addresses the increasing technological requirements and security standards that modern industrial environments require.

This guideline mentions relevant hardware and software information for migration of projects from S7-1200 PLCs to S7-1200 G2 (Generation 2) PLCs. This document will list detailed instructions on the integration process as well as new hardware and changes in programming structure. It also addresses potential complications and provides solutions to ensure a smooth transition.

The following core issues are addressed in this document.

- Comprehensive guide for upgrading your project to TIA Portal V20
- Preparation of S7-1200 G2 PLC for migration
- Integrating S7-1200 G2 into your Project: Finding the optimal approach
- Best Practices for a successful migration and focus on potential errors

1.2. Preliminary Information

1.2.1. Motivations for switching to S7-1200 Generation 2

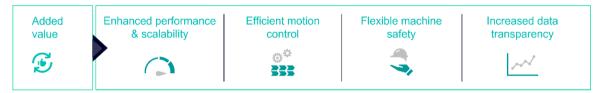


Figure 1-1: Four corner stones of S7-1200 G2 PLC family

- Enhanced performance & scalability.
 - Dual core processor with one core for processing tasks and one for communication
 - More memory ressources compared to the predecessor PLC
 - Supports isochronous real-time capabilities
 - PLCs of S7-1200 G2 enables synchronized program excecution for up to 31 PROTFINET devices
 - Compatible with SIMATIC Profiling to analyze and optimize programming runtime
- Efficient Motion control:
 - Supports the use of technology objects to control synchronize axes and reduce the configuration effort
 - Increases efficiency in comparasion with the predecessor PLC
- Flexible Machine safety:
 - A flexible machine safety concept for the S7-1200 G2 is underlined by Fail-safe integrated IOs and PROFIsafe communication, as well as an improved F-IO Portfolio with new Failsafe Signal Boards and mixed IO modules. (Fail safe IO modules will be released in the end of 2025.)
- Increased Data transparency:
 - Near-field communication (NFC) technology, which enables write and read capabilities of data on the PLC.
 - WebAPI, is used to access the web server of the PLC via the web API. This can be used for diagnostics, analytics and maintenance. No standard/default pages are available.

One of the main differences and advantages of the S7-1200 G2 family compared to the S7-1200 family is the reduction of the DIN rail footprint by \sim 25%. Additionally, their 8/16 Channel SM Modules save 33% and F-SM modules save 57% of DIN rail space, allowing for a more compact layout.

For dimensional comparison between S7-1200 and S7-1200 G2 see the Figure 1-2 below.



Figure 1-2: PLC dimension comparison

1.2.2. S7-1200 G2 Instruction speed execution

The following Table 1-1 presents enhanced performance in the instruction speed execution and a comparison to the predecessor S7-1200 PLC:

predecessor 37	1200 1 LC.						
		S7-1200 G2	S7-1200	Factor Better than G2	S7-1200 G2	S7-1200	Factor Better than G2
Type of instruc	tions		μs/instructions				
Type of mistractions		Direct	addressing (I	l, Q, M)	DB access		
Boolean		0.037	0.080	2.1	0.037	0.080	2.1
Move	Move_Bool	0.067	0.300	4.7	0.063	1.170	18.5
	Move_Word	0.027	0.137	5.0	0.029	1.000	34.5
	Move_Real	0.029	0.720	24.5	0.028	1.000	35.6
Real Math	Add Real	0.0114	1.480	13.0	0.071	1.780	24.9

Table 1-1: Enhanced performance in the instruction speed execution

1.2.3. Hardware

Before initiating migration, it is crucial to check if the availability of the used hardware is granted. Certain hardware modules may not be available at the planned time of migration. This can result in the necessity of waiting until these modules become accessible.

Please refer to the SIOS entry \$7-1200 G2 Programmable controller to see which hardware modules are available.

The modules are provided over Hardware Support Package over the SIOS Entry <u>TIA Portal (HSP)</u>. The migration of your project might be therefore linked to the different delivery phases. Please consider this before starting the migration process.

Further information is discussed in chapter To start with migration the available target S7-1200 G2 hardware and TIA Portal V20 is mandatory. There are two methods to achieve this:

- Migration Tool: This tool allows you to transfer all program elements from your S7-1200 PLC to the new S7-1200 G2 PLC. Extend of auto-migration in current version is discussed in Migration Checker and Migration .
- Manual Migration: Alternatively, you can manually migrate your project. HW elements needs to be selected and conncected manually. Software elements like program blocks either needs to be exported as source blocks and imported in the target S7-1200 G2 PLC or direct copy from source PLC and paste in target PLC aslo works.

Both methods will be explained in more detail in subsequent chapters of this document.

Differences between S7-1200 and S7-1200 G2.

1.2.4. Software

Supported Languages for S7-1200 G2:

- LAD (Ladder Logic)
- FBD (Function Block Diagram)
- SCL (Structured Control Language)
- CEM (Cause-Effect-Matrix)

Instructions for Programming:

STEP 7 provides instructions to program your S7-1200 G2 PLC. Categories and folders differ based on your programming language.

Instructions can be reached via selecting an instruction and pressing F1 online.

NOTE

In TIA Portal V20 OPC UA is not supported. This will be included in TIA Portal V21 (Planned: Dec. 2025).

Changes within Safety Basic license:

- V18/V19 Safety Basic licenses are still available.
- Safety Basic license will be included in the TIA Portal basic engineering license, hence an additional license to use the safety functionality of the S7-1200 G2 are not necessary.
- SUS contracts for Safety Basic are discontinued with the end of 2024.

For more information regarding new diagnostic features like profiling refer <u>SIMATIC Controller Profiling</u> page and NFC refer to the <u>S7-1200 G2 System Manual</u> or get to know more with videos and presentations in <u>SITRAIN course</u>.

Entry ID: 109986503 | V1.2 | 10/2025 © Siemens 2025 | **7**

2. Pre-migration

To start with migration the available target S7-1200 G2 hardware and TIA Portal V20 is mandatory. There are two methods to achieve this:

- Migration Tool: This tool allows you to transfer all program elements from your S7-1200 PLC to the new S7-1200 G2 PLC. Extend of auto-migration in current version is discussed in Migration Checker and Migration .
- Manual Migration: Alternatively, you can manually migrate your project. HW elements needs to be selected and conncected manually. Software elements like program blocks either needs to be exported as source blocks and imported in the target S7-1200 G2 PLC or direct copy from source PLC and paste in target PLC aslo works.

Both methods will be explained in more detail in subsequent chapters of this document.

2.1. Differences between S7-1200 and S7-1200 G2

In this section, we provide a comparative overview of the key Technology Objects (TO), and Organization Block (OB) features available in the S7-1200 and S7-1200 G2 controllers. The comparison highlights the advancements in the predecessor PLC, such as improved motion control and kinematic capabilities, as well as new features like Near Field Communication (NFC).

The table below summarizes the differences for quick reference. For a more in-depth discussion of these features, including implementation examples and practical considerations, please refer to the detailed analysis in Motion Control or the S7-1200 G2 PLC system manual.

The following represent a comparison between major feature differences between S7-1200 and S7-1200 G2:

Major Feature	S7-1200	S7-1200 G2
OPC UA Server	Yes	Future (End 2025)
Basic Motion Control	Yes	Future (End 2025)
Built-in Analog	Yes	On optional SM/SBs
Differential IO's	S7-1217	Future with SM 1225
Energy Meter	Yes	Future
Profiling	No	Yes
NFC	No	Yes (also available from FW V4.1)
Alarm instructions	Just user messages	S7-1500 functionality
Usage of optimized / unoptimized blocks	Yes / Yes	Yes / Yes
Isochronous Realtime	No	Yes
Retentive Memory	14 kB	20 kB
WebAPI	No	Yes

Table 2-1: Comparison S7-1200 and S7-1200 G2

While the S7-1200 G2 controllers are quite powerful, some features are missing in the current version. You can see some of these in the table or refer to the S7-1200 G2 manual to see which features are not included. The majority of these are discussed in upcoming chapters.

The alarm instructions functionality is like that of the S7-1500 PLCs. For motion control, Isochronous Real-Time communication is now supported. There is also an extra 6 kB of retentive memory, bringing the total supported memory to 20 kB.

The lack of a screen to check the PLC status can be addressed through the NFC feature. SIMATIC S7-1200 G2 NFC is a dedicated application for accessing PLC data on smartphones. (Currently available for iOS, Android app will be released in near future)

2.2. Pre-Migration preparation Hardware

2.2.1. Dimensional differences

Comparing the DIN rail mounting for Siemens S7-1200 and S7-1200 G2, the main differences are in space efficiency and how much DIN rail length the devices occupy. The overall geometrical appearance of the S7-1200 G2 has changed completely and needs to be considered for the installation in electronic cabinets.

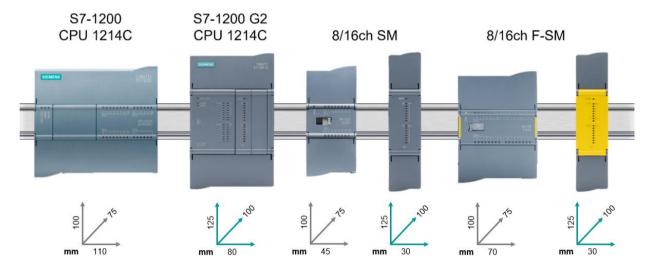


Figure 2-1: Dimension of PLC from both generations

To illustrate the dimensional differences on a DIN rail, taking wiring into account, here is a visual comparison:

S7-1200 with wired modules

S7-1200 G2 with wired modules

1x Communication Board

1x Communication board
1x Analog signal board



Figure 2-2: Wiring S7-1200 vs S7-1200 G2 wiring comparison photo

The S7-1200 G2 provides a significant improvement in space efficiency over the S7-1200 version:

The S7-1200 G2 can result in space savings of up to 27% less DIN rail space, allowing for a more compact layout. This size reduction in G2 models improves cabinet space efficiency but may require attention during installation, as the different dimensions could affect the fit within existing electrical cabinets.

NOTE

Reengineering due to changes in PLC dimensions:

The S7-1200 G2 has a different physical design than previous versions, which may require reengineering the electrical layout. This adjustment is essential to ensure that all components fit properly and that there's adequate spacing for airflow and maintenance.

Potential need for a new wiring plan:

Along with the layout adjustments, a new wiring plan may be necessary to accommodate the updated connections and optimize performance. This step ensures that all connections are mapped efficiently to the new S7-1200 G2 PLC.

Risk of damaging signal module pins



When attempting to extract the S7-1200 PLC and its associated modules from the rail, the entire group can be removed as a single unit. However, with the S7-1200 G2, attempting the same procedure risks damaging one or more pin connections. Therefore, it is necessary to disassemble the group and remove the modules individually before finally extracting the PLC. If you only want to extract the PLC, you can simply disassemble it from the group and then remove it. For more information, please refer to the S7-1200 G2 PLC system manual

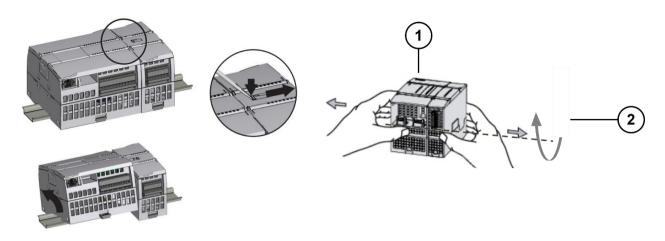


Figure 2-3: Detaching PLC from DIN rail

NOTE

Before starting the migration process, it is crucial to determine which modules are available. Certain hardware modules may not be available at the planned time of migration.

If your project relies on any modules which are not available, it is recommended to delay migration to

G2 PLC until full compatibility is confirmed.



For confirming the available hardware refer to <u>S7-1200 G2 Product catalog</u>

Summary

Compared to the S7-1200, the S7-1200 G2 provides more advanced features, higher performance, and better integration with modern industrial systems. As a result, the S7-1200 G2 is the preferred choice for more complex and future-proof automation solutions.

2.2.2. Wiring

While the S7-1200 G2 PLCs are compact and pack more functionalities at similar costs compared to the S7-1200 PLCs, the recommended wire and ferrule sizes for the S7-1200 G2 are mostly the same as those for the S7-1200. The only difference comes when wiring signal / communication board, the recommended size range would be:

Wire/cable size between 24 AWG to max 19 AWG (0.2 mm² to 0.75 mm²),

with wire/cable ferrule between AWG 24 to max. AWG 22 (0.25 mm² to 0.5 mm²)

2.2.3. IO Modules in higher temperature than maximum ambient conditions

Both S7-1200 PLCs and S7-1200 G2 PLCs can be used in recommended temperature range of minimum -20°C and derated maximum of 40°C.

As a recommendation, for temperatures between 40°C and 60°C the PLCs as well as the IO modules are to be used with 50% of the available IO's at max. voltage.

If all inputs and outputs are mandatory to be used with max voltage, then the recommended solution will be to use then alternately using relays. Using alternating IO will reduce the total heat loss and modules will remain safe.

Refer to Table 2.2 for more information.

The S7-1200 G2 as well as S7-1200 requires a thermal clearance of at least 25 mm above and below the unit for free air circulation. This is essential for maintaining proper cooling through natural convection. Additionally, there should be at least 25 mm of space between the front of the modules and the inside of the enclosure to ensure adequate ventilation.

A space reservation to the right and left of the PLC is recommended. Please note that space to the right is only required in cases where no modules are inserted.



Figure 2-4: Space required for natural convection cooling of S7-1200 G2 PLCs

Ambient conditions					
Free fall	S7-1200	S7-1200 G2			
● Fall height, max.	0.3 m; five times, in product package	0.3 m; five times, in product package			
Ambient temperature during operation					
• min.	-20°C	-20 °C; No condensation			
● max.	60 C; Number of simultaneously activated inputs or outputs 7 or 5 (no adjacent points) at 60 °C horizontal or 50 °C vertical, 14 or 10 at 55 °C horizontal or 45 °C vertical	40 °C; at max. voltages and max. specifications			
 horizontal installation, min. 	-20°C	-20 °C; No condensation			
horizontal installation, max.	60 C	60 °C; at rated voltages, 50 % of max. specification and alternate IO active			
vertical installation, min.	-20°C	-20 °C; No condensation			
vertical installation, max.	50 C	50 °C; at rated voltages, 50 % of max. specification and alternate IO active			
Ambient temperature during storage/transportation					
• min.	-40 C	-40 C			
• max.	70 C	70 C			
Air pressure acc. to IEC 60068-2-13					
Operation, min.	795 hPa	540 hPa			
Operation, max.	1 080 hPa	1 140 hPa			
• Storage/transport, min.	660 hPa	540 hPa			
Storage/transport, max.	1 080 hPa	1 140 hPa			
Altitude during operation relating to sea level					
 Installation altitude, min. 	-1 000 m	-1 000 m			
Installation altitude, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual			
Relative humidity					
 Operation, max. 	95 %; no condensation	95 %; no condensation			
Vibrations					
Vibration resistance during operation acc. to IEC 60068-2-6	2 g (m/s²) wall mounting, 1 g (m/s²) DIN rail	3.5 mm from 5 - 8.4 Hz, 1g from 8.4 - 150 Hz			
Operation, tested according to IEC 60068-2-6	Yes	Yes			
Shock testing					
• tested according to IEC 60068-2-27	Yes; IEC 68, Part 2-27 half-sine: strength of the shock 15 g (peak value), duration 11 ms	Yes; IEC 68, Part 2-27 half-sine: strength of the shock 15 g (peak value), duration 11 ms			
Pollutant concentrations	,	, a.a.o,, adiation 11 mo			
• SO2 at RH < 60% without condensation	S02: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60 % condensation-free	S02: < 0.5 ppm; H2S: < 0.1 ppm; RH < 60 % condensation-free			

Table 2-2: Ambient conditions comparison of S7-1200 and S7-1200 G2

2.2.4. Differential Inputs

The S7-1217C PLC features built-in differential outputs. These differential inputs can handle high-speed signals, with a maximum high-speed counter (HSC) input rate of 1 MHz for both single-phase and quadrature phase operations.

In the near future, these inputs will be available as an I/O module, the SB 1225, with the article number 6ES7225-3LD50-0XB0.

2.2.5. Checking Hardware compatibility

Verify that all existing S7-1200 hardware (PLCs, I/O modules, battery boards etc.) have direct equivalents in the S7-1200 G2 or are compatible with other S7-1200 G2 hardware modules.

Review the compatibility of external devices (drives, sensors, communication modules) to ensure they will work with the new S7-1200 G2 controllers. Check number IO required and their type in the target PLC.

2.3. Pre-Migration preparation for Software

2.3.1. Backing up the S7-1200 Project

Save and document your current TIA Portal project of the S7-1200, including all PLC programs, HMI configurations and user data. Perform a complete backup of the S7-1200 system using the TIA Portal archive, a TIA Project-Server or other backup methods, ensuring that no important data is lost during migration.

Keep a versioned archive of the project in case you need to revert to the original version at any point during or after the migration process.

2.3.2. Checking Software compatibility

Check if the S7-1200 G2 controllers can replace the S7-1200 controllers without requiring significant changes to your network and device configurations.

Run Migration Checker to know which TIA portal blocks can be transferred. More information in Chapter 3 <u>Migration</u> Checker and Migration Tool.

2.3.3. Updating TIA Portal to the latest version (V20)

Make sure you are running the latest version of TIA Portal (V20) that supports the S7-1200 G2 hardware. Perform any necessary firmware updates for the S7-1200 PLCs or related devices, as this can ensure better compatibility and fewer issues during migration.

Check for any software updates of existing S7-1200 hardware in TIA Portal to ease the migration process and fix known bugs.

2.3.4. Motion Control

The first major feature is enhanced scalability. With the S7-1200 G2, Motion Control functions are based on the same architecture across the current SIMATIC Controllers. This enables functional scaling from basic to advanced controllers, which means that user functions can be reused from the smallest S7-1200 G2 to the largest S7-1500 T-PLC.

Furthermore, isochronous drive communication is possible. This means that, the Controller can now be used with all SINAMICS Servo Drives for high dynamics and precision. More Information in <u>S7-1200 G2 PLC system manual</u>.

2.3.5. Supported Instructions

The S7-1200 G2 will support a various number of motion control blocks. These instructions are implemented in the TIA Portal Basic license.

Basic Motion Control instruction

MC_Power	MC_Stop
MC_Reset	MC_SetAxisSTW
MC_Home	MC_SaveAbsoluteEncoderData
MC_Halt	MC_MeasuringInput
MC_MoveAbsolute	MC_MeasuringInputCyclic
MC_MoveRelative	MC_AbortMeasuringInput
MC_MoveVelocity	MC_OutputCam
MC_MoveJog	MC_CamTrack

MC_GearIn

Table 2-3: Basic Motion Control instruction

NOTE

- Superimposed movements, torque limiting feature camming and gearing functions will be enabled in future TIA Portal release version.
- Also check for the extended motion control functions in <u>S7-1200 G2 PLC system manual</u>.

2.3.6. Supported Technology Objects

The S7-1200 G2 PLC provides varying levels of support for a range of Motion Control TOs, as described in the table below:

Motion Control Technology Objects

TO_SpeedAxis	TO_CamTrack
TO_PositioningAxis	TO_MeasuringInput
TO_SynchronousAxis	TO_Cam (Partially supported)
TO_ExternalEncoder	TO_Kinematics (Partially supported)

TO_OutputCam

Table 2-4: Motion Control Technology Objects

NOTE

• TO_PTOAxis and TO_PTOCommandTable (planned to be released in future)

2.3.7. Supported OBs

The S7-1200 G2 PLC provides support for the following Motion Control OBs:

Supported MC organizational blocks

MC_PreServo	MC_PreInterpolator
MC_Servo	MC_Interpolator
MC_PostServo	MC_LookAhead

Table 2-5: Supported MC organizational blocks

3. Migration Checker and Migration Tool

The S7-1200 hardware, its network connections and software blocks can be automatically migrated within TIA Portal V20 with the S7-1200 G2 Migration Tool Add-In.

3.1. Migration Checker

The Migration Checker function is included in S7-1200 G2 Migration Tool Add-In that helps verify whether the hardware components in an existing project are supported by the TIA Portal V20. Depending on the available hardware and software version. The Migration Checker is a preliminary step before starting the migration process itself.

It runs compatibility check to verify if the hardware and software components are supported by TIA Portal and can be migrated or not.

• Detailed log files provides information on compatibility issues and recommendations for resolving them. Both migration check and migration report (log files generated after migration execution) are stored under user file folder of the project.

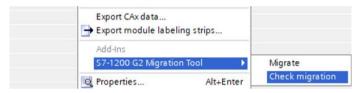


Figure 3-1: Check Migration Function

NOTE

Use the Migration Checker before starting with the migration steps. It is beneficial to get a general overview about the project and where to start the troubleshooting.

3.2. SIMATIC S7-1200 G2 Migration Tool Add-In

With the V1.1.1 of Migration Tool it is possible to migrate following:

- 1. Just Hardware (for HW which is available during the release of "Current Version")

 Network is set automatically also in topology view (please check for more clarification).
- 2. Just Software (consider implementing changes in configuration of function in the target PLC for not supported blocks)
- 3. Both Software and Hardware (consider HW availability and SW changes (unsupported function by S7-1200 G2 PLC))
- 4. Furthermore, when migrating software, it is possible to skip or overwrite existing elements which are already available in the target PLC.

NOTE

Migration Tool compares names of the software element. Renaming the program elements is recommended if selected target PLC software elements are not to be overwritten.



Figure 3-2: SIMATIC S7-1200 G2 Migration Tool UI

Before migration, S7-1200 source PLC is not removed but detected form the network.

Please refer to the Migration Tool documentation under the SIOS entry TIA Add-Ins for more details.

NOTE

It is recommended to use always a combination of the Migration Tool and manual adjustment to achieve the best results.

3.3. Migration reports

After execution of the migration, a result is mentioned within the Migration Tool UI. This result gives an overview of copied and ignored objects. Ignored objects can be because of the following reasons:

- Ignored HW: Because of the non avaibility of the HW for S7-1200 G2 PLC.
- Ignored SW:
 - Selected Skip existing elements: already existing object with the same name in the target PLC. For example migrating a function block named FlyingSawAlgo to G2 PLC, where FlyingSawAlgo already exist.
 - Not supported / not compile error free elements

NOTE

After migration a report is generated and saved locally. This consists of ignored and migrated objects information. The report is saved as a CSV file in the UserFiles folder within the project folder. To directly access this folder location, use the "Open Folder" button provided on the migration report window.

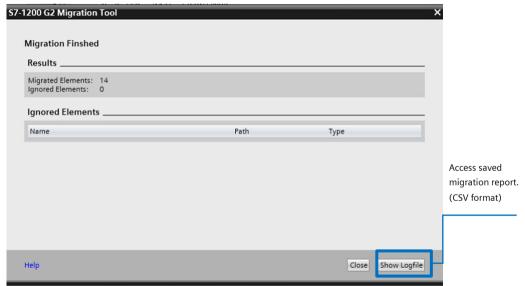


Figure 3-3: Migration Tool Results

4. Post-migration manual procedure

After the Migration Tool has been successfully executed, depending on the project content, the required manual steps need to be completed. This manual step will ensure the consistency of the program and the completion of all hardware components and properties. The listed steps are a recommendation of locations to check within the target PLC.

Add-In is limited in copying specific hardware properties, HMI connections and tags as well as technology objects and motion control blocks. Those limitations are mainly caused by the different architectural design of the S7-1200 PLC and the S7-1200 G2 PLC.

4.1. Not available Hardware / Hardware alternatives

MLFB	Module description	Workaround	Planned release in future?
6ES7222- 1XF30-0XB0	(Not available anymore) SIMATIC S7-1200, Digital output SM 1222, 8 DO, Relay changeover contact	-	End of 2026
6ES7222- 1XF32-0XB0	SIMATIC S7-1200, Digital output SM 1222, 8 DO, Relay Changeover contact	-	End of 2026
6ES7223- 1BL32-1XB0	SIMATIC S7-1200, Digital I/O SM 1223, 16 DI/16 DO, 16 DI 24 V DC; sourcing/sinking input, 16 DO, sourcing (sinking output), NPN transistor 0.5 A	-	End of 2025
6ES7223- 1QH30-0XB0	(Not available anymore)***Spare part*** SIMATIC S7-1200, Digital I/O SM 1223, 8 DI AC/8 DO RLY, 8 DI 120/230 V AC, 8 DO relay 2 A	-	End of 2026
6ES7223- 1QH32-0XB0	SIMATIC S7-1200, Digital I/O SM 1223, 8 DI AC/8 DO RLY, 8 DI 120/230 V AC, 8 DO relay 2 A	-	End of 2026
6ES7231- 5ND30-0XB0	(Not available anymore)***Ersatzteil*** SIMATIC S7-1200, Analogeingabe, SM 1231, 4 AI, +/-10V, +/-5V, +/-2.5V, +/-1,25 oder 0- 20mA/4-20mA, 15 Bit+Vorzeichen Bit	-	End of 2026
6ES7231- 5ND32-0XB0	SIMATIC S7-1200, Analog input, SM 1231, 4 AI, +/-10 V, +/-5 V, +/-2.5 V, +/-1.25 or 0-20 mA/4-20 mA, 15 bit+sign bit	-	End of 2026
6GK7242- 5DX30-0XE0	Communications module CM 1242-5; for connection of SIMATIC S7-1200 to PROFIBUS as DP slave module.	-	Mid of 2026
3RK7243- 2AA30-0XB0	SIMATIC S7-1200, CM 1243-2 communication module AS-Interface master according to AS-i specification V3.0	based on ET 200SP	-
6GK7243- 5DX30-0XE0	communications module CM 1243-5 for connection of SIMATIC S7-1200 to PROFIBUS as DP Master module; PG/OP communication; S7 communication.	-	Mid of 2026
6GT2002- 0LA00	RFID Communication Module RF120C für SIMATIC S7-1200; 1 Reader anschließbar; RS-422 oder RS232.	based on RF128C (6GT2002-0LE40)	-
3RK7271- 1AA30-0AA0	SIMATIC S7-1200, DCM 1271 Data decoupling module for AS-i Master CM 1243-2 IN: 24 V / 30 V DC OUT: 1x AS-Interface, 4 A Integrated overload protection integr. ground fault detection Signaling contact	based on dec. ET 200SP	-
6GK7243- 1BX30-0XE0	Communications processor CP 1243-1 for connection of SIMATIC S7-1200 as additional Ethernet interface and for Connection to control centers via telecontrol protocols (DNP3, IEC 60870, TeleControl Basic), security (Firewall, VPN).	multiple FW steps to complete the featureset; V21: Ethernet + DNP3 (later Firewall, VNP, IEC 60870 + TeleControl/IRC)	Nov 2025 Consolidated module CP 1243-1

MLFB	Module description	Workaround	Planned release in future?
6GK7243- 7KX30-0XE0	Communications processor CP 1243-7 LTE EU for Connection of SIMATIC S7-1200 to LTE network in European frequency range.	based on bundle (6GK7243-1BX50- 0AP1/2) G2 CP 1243-1 + SCLANCE M876- 4LTE/Scalance MUB852- 1 (5G)	Nov 2025 Consolidated module CP 1243-1
6GK7243- 7SX30-0XE0	Communications processor CP 1243-7 LTE EU for Connection of SIMATIC S7-1200 to LTE network in European frequency range.	based on bundle (6GK7243-1BX50- 0AP1/2) G2 CP 1243-1 + SCLANCE M876- 4LTE/Scalance MUB852- 1 (5G)	Nov 2025 Consolidated module CP 1243-1
6GK7243- 8RX30-0XE0	Communications processor CP 1243-8 IRC for operating a SIMATIC S7-1200 in the TeleControl system Professional; for SINAUT ST7; DNP3; IEC 60870-5, station type: RTU; WAN connections;1) Ethernet 2) Additionally expandable with TS module RS-232 or TS module modem or TS module GSM or TS module ISDN; Operation with TIM modules possible.	-	Nov 2025 Consolidated module CP 1243-1
6GT2002- 0LA00	RFID communication module RF120C for SIMATIC S7-1200; 1 reader connectable; RS-422 or RS232.	based on RF128C (6GT2002-0LE40)	-
6ES7297- 0AX30-0XA0	SIMATIC S7-1200, Battery Board BB 1297 for long-term buffering of the real time clock, plug-in in the signal board receptacle of the S7-12XX (FW3.0 or higher); Battery (CR1025) not included in scope of delivery	-	2026
6ES7238- 5XA32-0XB0	SIMATIC S7-1200, Analog input, SM 1238 Energy Meter 480 V AC, power measurement module for data acquisition in 1- and 3-phase supply systems (TN, TT) up to 480 V AC; Current range: 1 A, 5A; acquisition of voltage, current, phase angles, power, energy values, frequencies; Channel diagnostics	-	Mid 2026
6ES7278- 4BD32-0XB0	SIMATIC S7-1200, SM1278 IO-Link, 4xIO-Link Master	-	Mid 2026
6GK7242- 7KX31-0XE0	Kommunikationsprozessor CP 1242-7 V2, Anschluss SIMATIC S7-1200 an GSM/GPRS	based on bundle (6GK7243-1BX50- 0AP1/2) G2 CP 1243-1 + SCLANCE M876- 4LTE/Scalance MUB852- 1 (5G)	Nov 2025 Consolidated module CP 1243-1
6AG1242- 5DX30-2XE0	Kommunikationsmodul CM 1242-5, zum Anschluss von S7-1200 an PROFIBUS	-	End of 2026
6AG1243- 5DX30-2XE0	Kommunikationsmodul CM 1243-5, zum Anschluss von S7-1200 an PROFIBUS	-	End of 2026
6ES7972- 0MS00-0XA0	SIMATIC S7, TS Modul RS-232 für SIMATIC Teleservice	-	FW update f. 6GK7243- 1BX50-0XE0 >V21
	Failsafe Modules		Phased Release 2026-2027

Table 4-1: Planned hardware release and workarounds for not planned

^{*}Bundle: Term used here to suggest solution possible with multiple hardware.

4.2. Hardware properties

In case of adjusted hardware properties on the S7-1200 PLC or connected IO-Modules a manually check and change is recommended. The Add-In does not read out properties, for the onboard periphery such as values for the highspeed counter (HSC), pulse train output (PTO), settings for the onboard analogue modules and DI/DQ addresses. General PLC properties such as startup, cycle, communication load and protection/security settings are values that won't be touched by the Add-In.

Also, properties that were changed from the default settings of the PLC, signal boards and signal modules need to be checked.

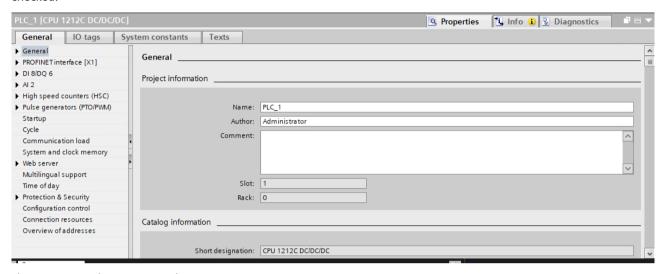


Figure 4-1: Overview HW properties on S7-1200

The usage of the onboard analog in- and outputs of the S7-1200 need to be replaced by a signal board for the S7-1200 G2. Please check before ordering the hardware needed, if the onboard analog in- and outputs are used in your hardware properties.

The PROFINET interface is not migrated by the S7-1200 G2 Migration Tool Add-In. An adjustment of IP and Subnet mask of the target PLC is necessary.

In this checklist you can find all possible property settings that can be selected on your S7-1200 PLC in TIA Portal:

No.	Hardware properties to check	Checkbox
1.	PROFINET interface [X1]	
1.1	General (IP-Address and Subnet)	
1.2	F-parameters (in case of Fail-safe PLC)	
1.3	Ethernet addresses	
1.4	Operating mode	
1.5	Advanced Options	
1.6	Web server access	
2.	DI/ DQ	
2.1	General	
2.2	DI Channels 0 – X	
2.3	DQ Channels 0 – X	
3.	AI 2/ AQ 2	
3.1	General	

No.	Hardware properties to check	Checkbox
3.2	Analog inputs Channels 0 – 1	
3.3	Analog outputs Channels 0 – 1	
3.4	I/O addresses	
4.	High speed counters (HSC)	
4.1	Enabled	
4.2	If yes, check all the parameters listed below	
5.	Pulse generators (PTO/PWM)	
5.1	Enabled	
5.2	If yes, check all the parameters listed below	
6.	Startup (if default values are set; items listed below can be ignored)	
6.1	Startup after POWER ON (Default value: Warm restart – mode before POWER OFF)	
6.2	Comparison preset to actual configuration (Default value: Startup PLC even if mismatch)	
6.3	Configuration time (Default value: 60.000 ms)	
7.	Cycle	
7.1	Cycle monitoring time (Default value: 150 ms)	
7.2	Enable minimum cycle time for cyclic OBs (Default: disabled) – Default setting is enabled on G2	
8.	Communication load (Default value: 20%) – Default setting on G2 is: 50%	
9.	System and clock memory (Default value: disabled)	
10.	Webserver	
10.1	Enabled	
10.2	If Webserver is used – functionality needs to be rebuilt on the Web API of the G2	
11.	Time of day	
11.1	Local Time	
11.2	Daylight saving time (Defaul value: enabled	
12.	Protection & Security (Start security wizard)	
12.1	Protection of confidential PLC configuration data	
12.2	Access control configuration	
12.3	Access level	
12.4	Communication mode to TIA Portal and HMI (Default value: enabled "Only allow secure PG/PC and HMI communication") – cannot be disabled on G2	
12.5	Permit access with PUT/GET communication from remote partner (Default value: disabled)	
13.	OPC UA (Default value: disabled) – functionality is not yet implemented into G2	

Table 4-2: Checklist for hardware properties

With the checklist, a step-by-step comparison will be easy. It is mandatory and proposed to double-check all properties set on the source PLC. The checklist shows all property items that need to be checked. After comparing the listed items with the properties of the target PLC, mark the checkbox column.

4.3. Software

After the successful execution of the S7-1200 G2 Migration Tool Add-In the target PLC will be compiled. The compiler information is the first hint to find any discrepancies between the source and the target PLC.

4.3.1. PLC Tags - System and clock memory

For PLC tags it is important to check, if on the hardware properties the system and clock memory is enabled (also see No. 9 in the checklist of Table 4-2 Checklist for hardware properties.) The system and clock memory bits are set automatically by the system, based on the selected hardware properties. A discrepancy of Bit/Byte addresses can occur.

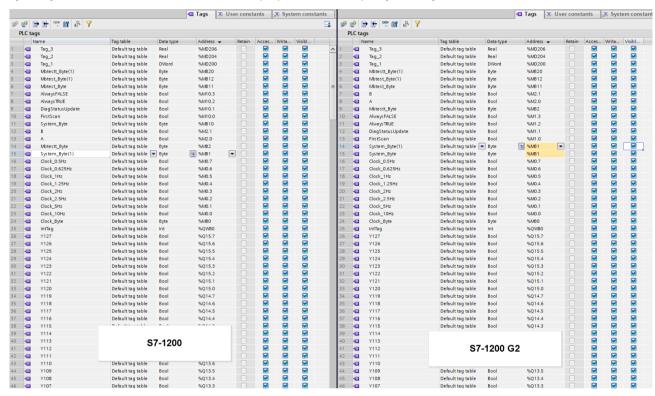


Figure 4-2: Comparison of tag tables after successful use of Migration Tool

If the system and clock memory is disabled, this step can be ignored. The PLC tags are copied from the source to the target PLC without any issues.

4.3.2. Copy Protection

Copy protection for S7-1200 G2 PLCs is currently not possible. A solution will be provided in the future.

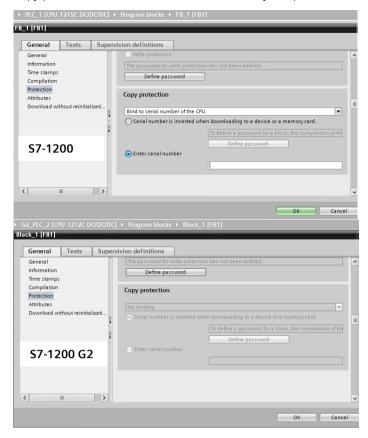


Figure 4-3: Copy protection

Work around for migrating copy protected blocks from S7-1200 to S7-1200 g2 is to read I&M data of the PLC (Serial number) and copy protect the block to the S7-1200 G2 Serial number. Then let this block compare the copy protection serial number in the new s7-1200 G2 PLC.

FAQ: https://support.industry.siemens.com/cs/ww/en/view/109747174/96588702603

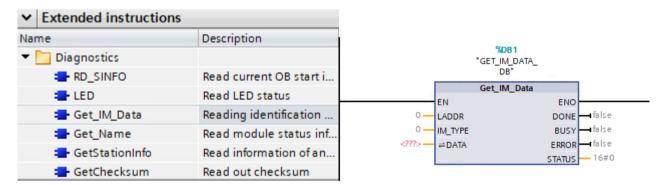


Figure 4-4: Get_IM_Data to read serial number of PLC

4.3.3. Control Highspeed Counter

With "Control High Speed Counter" instruction, you can parameterize and control the high-speed counters supported by the PLC by loading new Values into the counter.

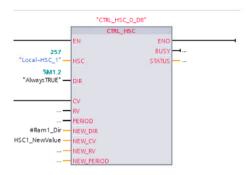


Figure 4-5: Highspeed counter functionality

Solution:

You can replace it with a simpler function CTRL_HSC_EXT.

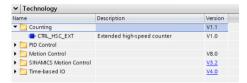


Figure 4-6: Control Highspeed counter extended instruction

Configuration for this block is to be done directly in hardware settings.

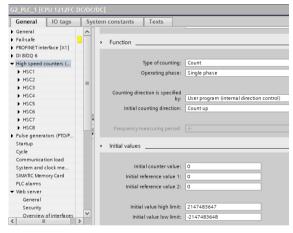


Figure 4-7: Highspeed counter configuration

Follow the instructions mentioned on TIA Portal Help page.

4.3.4. Web server configuration of S7-1200

In S7-1200 G2 the WWW instruction block is not supported anymore, which is responsible for initializing the web server and synchronizing the user-defined web pages.

Calling the WWW in the OB1 for this example project looks like:

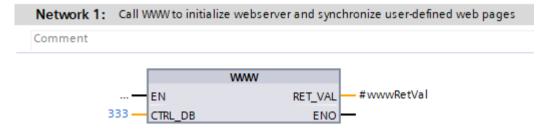


Figure 4-8: WWW Block

The configuration needed to generate the relevant information for the PLC needs to be done under the Web server configuration > User-defined pages:



Figure 4-9: S7-1200 PLC Webserver configuration

Solution:

Currently, the process is completely independent from PLC programming. The person responsible for developing the web pages can be a different person that the one that develops the PLC code. With this approach, web programming is separated from PLC programming, and for that reason a license is not needed to develop this user-defined web page.

The WWW instruction is removed from OB1 and the DBs generated to store the code are no longer needed. It is useful memory that can be used for other purposes. To free up the memory select delete blocks:

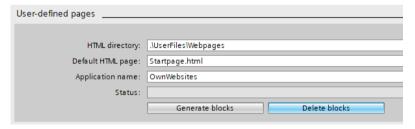


Figure 4-10: S7-1200 G2 Web Server Configuration

The configuration now needs a third software component to interact with the web API of the web server. It is an open-source tool called Web Application Manager. It can interact directly with the PLC. The process to perform a download is the following:

Web Application Manager

This application is an opensource application that allows a user to simply perform the download of a complete web application to the PLC, making the process completely independent from TIA Portal.

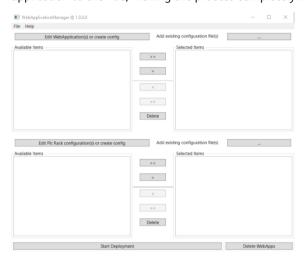


Figure 4-11: Web Application Manager (Opensource)

WebAPI Application Example:

Creating User-Defined Web Pages with the Web API for SIMATIC S7-1200 G2 / S7-1500

4.4. Technology Objects & Motion Control

With the S7-1200 G2 technology objects (TO) were introduced into the basic automation sector. The catalogue of TO's for Motion Control for the S7-1200 G2 was expanded:

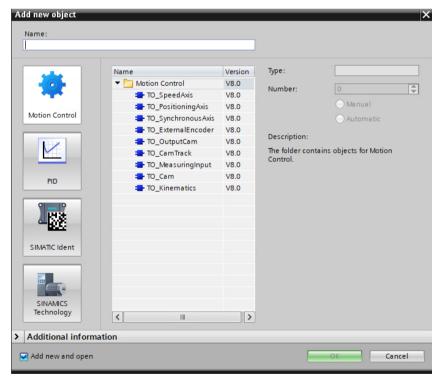


Figure 4-12: S7-1200 G2 TO catalogue

The migration Add-In is not capable of migrating existing TOs into the target PLC. It is suggested to rebuild the motion control functionalities with the use of TOs. In case of existing TO's in the source PLC, it is recommended to create new TO's

The connection type of the drive with the source PLC plays an important role. If the drive is wired directly onto the High-speed counter (HSC) and pulse output (PTO), please follow the instructions under this <u>Application example</u> to enable the functionality for the S7-1200 G2. A direct migration of this connection is not possible and must be done manually.

4.4.1. TOs for PID Controller

The TOs for PID Controller are partially migrated by the Migration Add-In. But the program logic will be migrated to the target PLC. To conserve the TO's parameters it is suggested to migrate TOs by generating source file from source PLC and importing this source file to the target PLC.

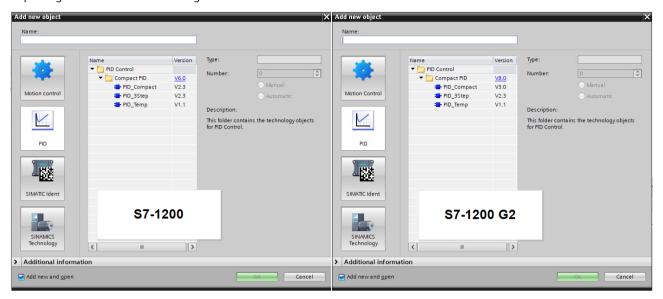


Figure 4-13: Comparison TOs for PID Control

NOTE

A source file of any TO will consists of user defined parameters.

4.4.2. MC Blocks

Due to the different version number of Motion Control blocks and changes of the interface it is recommended to check the MC blocks after the migration.

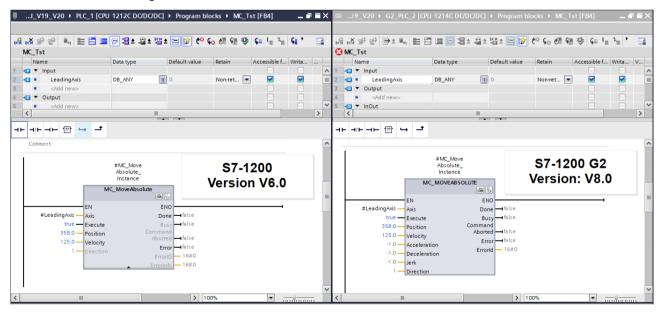


Figure 4-14: MC_MoveAbsolute interface differences between S7-1200 and S7-1200 G2

The S7-1200 G2 Migration Tool Add-In will copy the in- and output values of the block from the source to the target PLC. Also, the block interface is updated onto the version V8.0 or later.

With the global search function of TIA Portal V20 the cross-reference of the MC-Blocks can be found. It is suggested to navigate through the search results, and doublecheck if all block interfaces are correctly migrated.

4.5. HMI connections / tags

4.5.1. Creating new HMI connection for target PLC

The existing connection of an HMI panels to the source PLC needs to be re-established. The HMI connection must be manually modified in the device & networks view and connected to the target PLC. To avoid network conflicts the target PLC must be in the same subnet mask as the HMI panel.

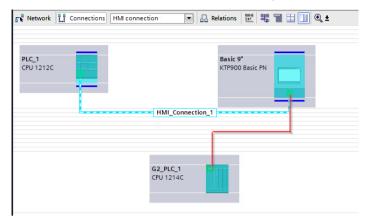


Figure 4-15: Device and Network View

After the manual adjustment check the connection name under the "Connections". The name might be changed.

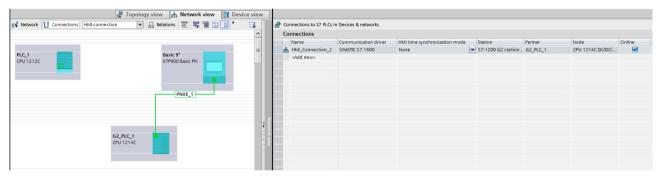


Figure 4-16: Re-established HMI-connection

The changed name of the connection will lead to a compiler error and discrepancies in the connection of HMI tags and PLC tags. To fix this issue please follow the instructions under $\frac{4.5.2}{1.5.2}$.

4.5.2. Updating Tag table content

Start with renaming the connection to the name that was previously used. The PLC tags were already migrated to the target PLC during the use of the S7-1200 G2 Migration Tool Add-In.

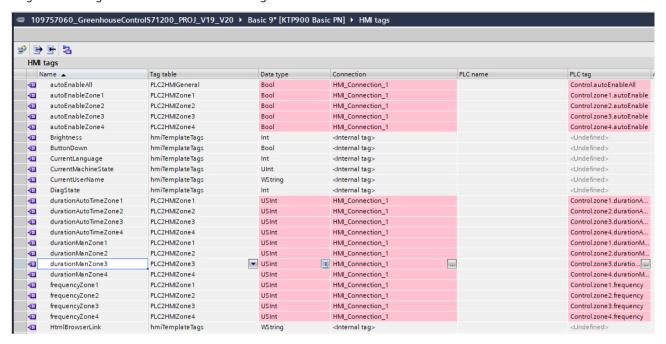


Figure 4-17: HMI tag table discrepancies of the new connection

To easily fix the data type, connection and PLC tag issues just use the export and import functionality of the HMI tags window. You will find the buttons in the tool bar or shown in Figure 4-18.



Figure 4-18: Import/export function in tool bar

The export and import of the HMI tags will solve the HMI tags issues and reconfigure the connection to the PLC tags of the target PLC.

4.6. Security Settings

The newly created S7-1200 G2 needs to have the same access rights, as the source PLC. Therefore, double check the settings within the Users and Roles of TIA Portal V20 for the configured PLCs.

4.7. Transfer Watch, Force and Trace Tables Manually

The watch and force tables are migrated with the Migration Tool V1.1.1 onwards. If variables in these tables are somehow connected to an error element, the Migration Tool will ignore that table.

Watch, Force and trace tables

Method 1: Direct Copy-Paste

- Find the "Watch and Force Tables" section of the source PLC.
- Select all relevant tables, right-click, and choose "Copy".

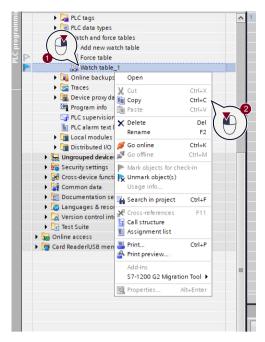


Figure 4-19: Transferring Watch Tables

• Navigate to the target PLC and paste the tables.

Method 2: Manual Creation and Paste

In the target PLC, manually create Watch and Force Tables with the same names as those in the Source PLC.

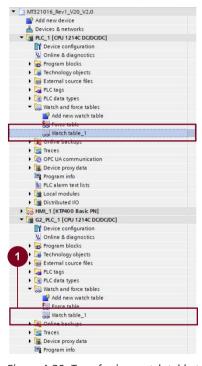


Figure 4-20: Transferring watch table to target PLC

Access the "Watch and Force Tables" section of the source PLC. To make this the first step is to right-click near the number of the first element to select all the rows. Next you have to press the button shift and the down arrow on the keyboard to select the rest of the elements.

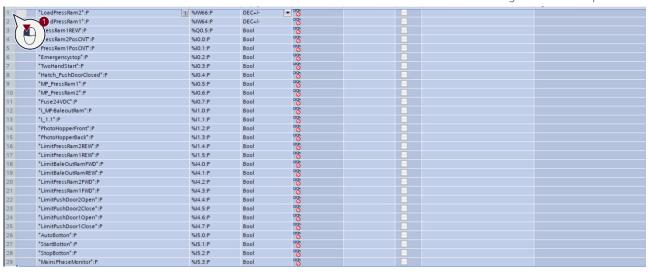


Figure 4-21: Copy Paste of Watch table tags

• Navigate to the newly created tables in the target PLC, right-click, and select "Paste" to transfer the tables.

Transfer Trace Tables

- Locate the "Trace Tables" section of the source PLC
- Select all trace tables, right-click, and choose "Copy"
- Go to the target PLC and paste the trace tables

5. Appendix

5.1. Service and support

SiePortal

The integrated platform for product selection, purchasing and support - and connection of Industry Mall and Online support. The SiePortal home page replaces the previous home pages of the Industry Mall and the Online Support Portal (SIOS) and combines them.

- Products & Services
 In Products & Services, you can find all our offerings as previously available in Mall Catalog.
- Support
 In Support, you can find all information helpful for resolving technical issues with our products.
- mySiePortal
 mySiePortal collects all your personal data and processes, from your account to current orders, service requests and
 more. You can only see the full range of functions here after you have logged in.

You can access SiePortal via this address: sieportal.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts.

Please send queries to Technical Support via Web form: support.industry.siemens.com/cs/my/src

SITRAIN - Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page: siemens.com/sitrain

Industry Online Support app

You will receive optimum support wherever you are with the "Industry Online Support" app. The app is available for iOS and Android:





5.2. Links and literature

No.	Topics	
\1\	SiePortal https://sieportal.siemens.com	
121	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/109986503	
/3/	S7-1200 G2 Programmable controller https://support.industry.siemens.com/cs/ww/en/view/109972011	
\4\	SIMATIC Controller Profiling https://support.industry.siemens.com/cs/ww/en/view/109750245	
151	Programming Guideline Safety for SIMATIC S7-1200/1500 https://support.industry.siemens.com/cs/ww/en/view/109750255	
161	Webserver Manual https://support.industry.siemens.com/cs/ww/en/view/59193560	

5.3. Change documentation.

Version	Date	Modification
V1.0	03/2025	First version
V1.1.1	09/2025	Changed document structure Added information: Hardware future release workarounds Wiring Migration Tool Motion control
V1.2	10/2025	Planned release Dates added

Entry ID: 109986503 | V1.2 | 10/2025 © Siemens 2025 | **34**