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APPLICATION EXAMPLE

SIMATIC S7-1200 G2 Migration Guideline

Support for Project migration SIMATIC S7-1200 Generation 2

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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 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 provides relevant hardware and software information for the migration of projects from S7-1200 PLCs to S7-1200 G2 (Generation 2) PLCs. This document provides 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 or later. Recommended Firmware Version 4.1.X (TIA Portal V21 or later)
- 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 cornerstones of S7-1200 G2 PLC family

- Enhanced performance & scalability.
 - Dual core processor with one core for processing tasks and one for communication
 - More memory resources compared to the predecessor PLC
 - Supports isochronous real-time capabilities
 - S7-1200 G2 PLCs enable synchronized program execution for up to 31 PROFINET devices
 - Compatible with SIMATIC Profiling to analyze and optimize programming runtime
- Efficient motion control:
 - Supports the use of technology objects to control and synchronize axes and reduce configuration effort
 - Increases efficiency in comparison with the predecessor PLC
- Flexible machine safety:
 - A flexible machine safety concept for the S7-1200 G2 is underlined by fail-safe integrated I/Os and PROFIsafe communication, as well as an improved F-I/O Portfolio with new fail-safe Signal Boards and mixed I/O modules. (Fail safe IO modules will be released in the end of 2025.)
- Increased data transparency:
 - Near-field communication (NFC) technology, which enables reading and writing data on the PLC.
 - WebAPI, is used to access the PLC web server. 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 ~ 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 a 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:

		S7-1200 G2	S7-1200	Factor relative to S7-1200 G2	S7-1200 G2	S7-1200	Factor relative to S7-1200 G2
Type of instructions		µs/instructions					
		Direct addressing (I, 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: Improved instruction execution speed

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 [S7-1200 G2 Programmable controller](#) to see which hardware modules are available.

The modules are provided over Hardware Support Package over the SIOS Entry [TIA Portal \(HSP\)](#). 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 2.

To start the migration, S7-1200 G2 hardware and TIA Portal V20 or later are required. 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 Tool](#).
- **Manual Migration:** Alternatively, you can manually migrate your project. HW elements need to be selected and connected manually. Software elements such as program blocks either need to be exported as source blocks and imported into the target S7-1200 G2 PLC, or copied directly from the source PLC and pasted into the target PLC.

Both methods will be explained in more detail in subsequent chapters of this document e.g. in [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 accessed by selecting an instruction and pressing F1.

Note

The OPC UA functionality for the S7-1200 G2 is not supported in TIA Portal V20 and Firmware Version 1.X

Changes to the Safety Basic license:

- Safety Basic licenses from V18/V19 remain available.
- Starting with TIA Portal V20, the Safety Basic license is included in the base license. No additional license is required to use the safety functions of the S7-1200 G2.
- SUS contracts for Safety Basic are discontinued with the end of 2024.

For more information regarding new diagnostic features such as profiling, refer to [SIMATIC Controller Profiling](#) page and for NFC refer to the [S7-1200 G2 System Manual](#) or learn more through training material in the Freemium category of [SITRAIN access](#).

2. Pre-migration

To start the migration, S7-1200 G2 hardware and TIA Portal V20 or later are required. 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. The full extent of the Migration Tool in the current version is discussed in Migration Checker and Migration section.
- **Manual Migration:** Alternatively, you can manually migrate your project. HW elements need to be selected and connected manually. Software elements such as program blocks either need 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 also 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 on the S7-1200 and S7-1200 G2 controllers. The comparison highlights the advancements over 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 represents a comparison of the major feature differences between S7-1200 and S7-1200 G2:

Major Feature	S7-1200	S7-1200 G2
OPC UA Server	Yes	Yes
Basic Motion Control	Yes	Yes
Built-in Analog	Yes	On optional SM/SBs
Differential I/O's	S7-1217	Future with SM 1225
Energy Meter	Yes	Future
Profiling	No	Yes
NFC	No	Yes
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 NFC feature provides a more flexible solution for accessing PLC information via a mobile device. SIMATIC S7-1200 G2 NFC is a dedicated application for accessing PLC data on smartphones. Available for both Android and iOS in their respective app stores.

For a more comprehensive overview of the system differences of SIMATIC S7 PLCs, including the S7-1200, S7-1200 G2, and S7-1500, the [comparison list](#) can also be used.

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 installation in electrical cabinets.

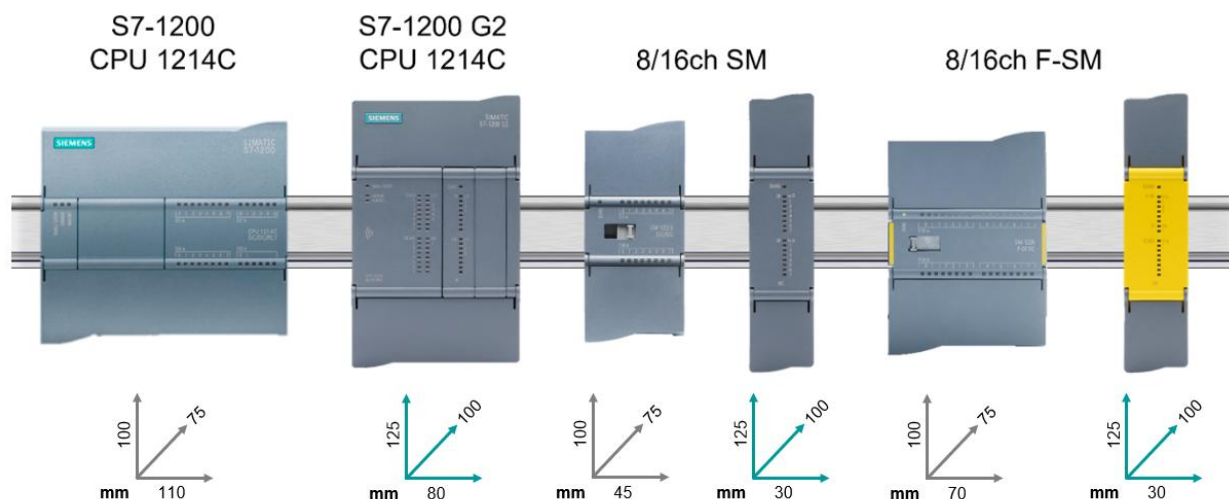


Figure 2-1: Dimension of PLC from both generations

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

S7-1200 with wired modules

1x Communication Board

S7-1200 G2 with wired modules

1x Communication Board

1x Analog Signal Board

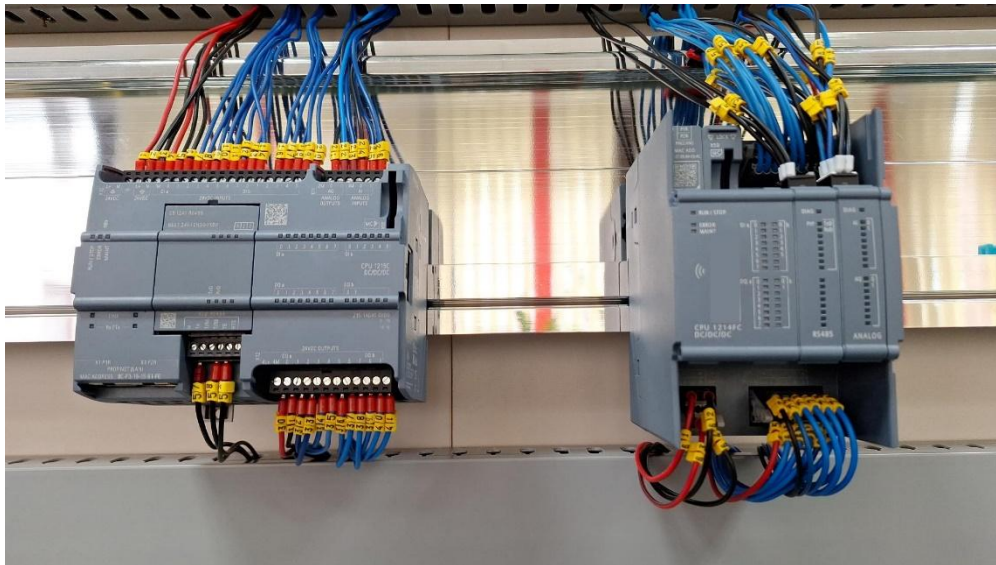


Figure 2-2: Wiring S7-1200 vs S7-1200 G2 wiring comparison photo

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% in 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 is adequate spacing for airflow and maintenance.

Potential need for a new wiring plan:

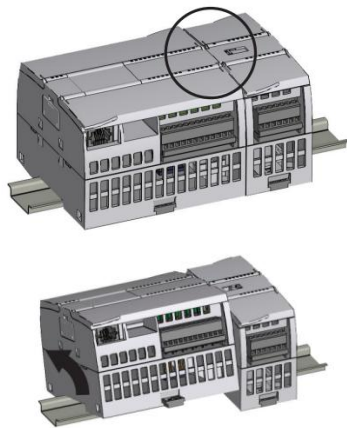
Along with the layout adjustments, a new wiring plan may be necessary to accommodate the updated connections and optimize performance. This step ensures that all connections are mapped efficiently to the new S7-1200 G2 PLC.



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](#)

Removing G1 from the DIN rail



Removing G2 from DIN rail

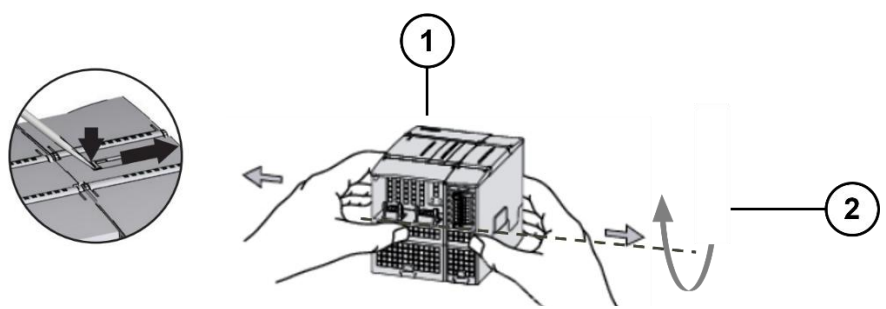


Figure 2-3: Detaching PLC from DIN rail

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 [Delivery release S7-1200 G2 PLC](#) or the [Products & Services Tab in SiePortal](#).

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 offer more functionality 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 the 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.

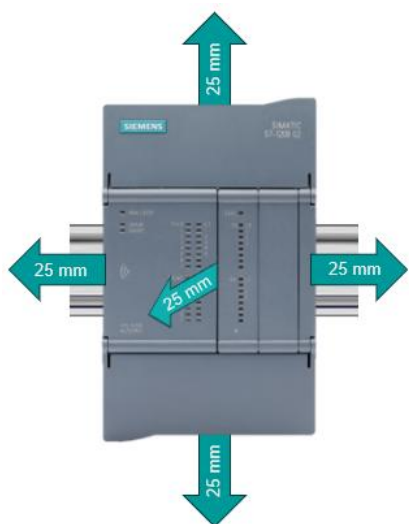


Figure 2-4: Space required for natural convection cooling of S7-1200 G2 PLCs

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/s ²) wall mounting, 1 g (m/s ²) 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		
• SO ₂ at RH < 60% without condensation	SO ₂ : < 0.5 ppm; H ₂ S: < 0.1 ppm; RH < 60 % condensation-free	SO ₂ : < 0.5 ppm; H ₂ S: < 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.

These differential inputs will be available as the Signal board SB 1225 for the S7-1200 G2.

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 [Migration Checker and Migration Tool](#).

2.3.3. Updating TIA Portal to the latest version (V20/ V21 or later)

Make sure you are running the latest version of TIA Portal (V20/V21 or later) 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 [S7-1200 G2 PLC system manual](#).

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 instructions

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 instructions

PTO Motion Control instructions

MC_Power_PTO	MC_MoveVelocity_PTO
MC_Reset_PTO	MC_MoveRelative_PTO
MC_Home_PTO	MC_MoveAbsolute_PTO
MC_Halt_PTO	MC_MoveJog_PTO
MC_CommandTable_PTO (Future)	

Table 2-4 PTO Motion Control

NOTE

Also check for the extended motion control functions in [S7-1200 G2 PLC system manual](#).

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 2-5: Motion Control Technology Objects

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 2-6: 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 or newer. The availability of hardware and software version needs to be considered. The Migration Checker is a preliminary step before starting the migration process itself.

It runs compatibility checks 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.

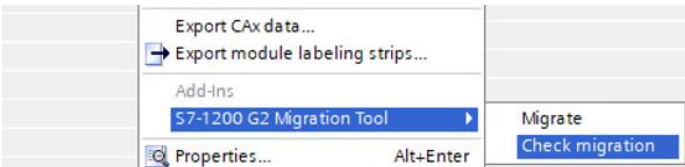


Figure 3-1: Check Migration Function

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 Migration Tool V2.0 it is possible to migrate following:

- 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).
- Just Software (consider implementing changes in configuration of function in the target PLC for not supported blocks)
- Both - Software and Hardware (consider HW availability and SW changes (unsupported function by S7-1200 G2 PLC))
- 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.

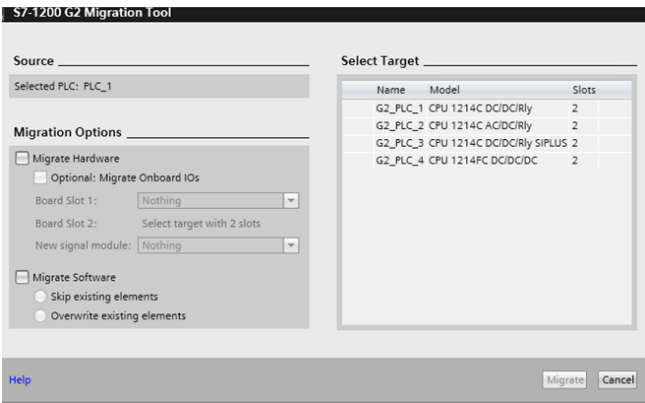


Figure 3-2: SIMATIC S7-1200 G2 Migration Tool UI

After migration, S7-1200 source PLC is not removed but detached from the network.

Please refer to the Migration Tool documentation under the SIOS entry [TIA Add-Ins](#) for more details.

NOTE

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

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 Hardware: Because of the non availability of a suitable equivalent for Hardware of S7-1200 G2 PLC and Module.
- Ignored Software:
 - 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 TIA Portal project folder. To directly access this folder location, use the "Open Folder" button provided on the migration report window.

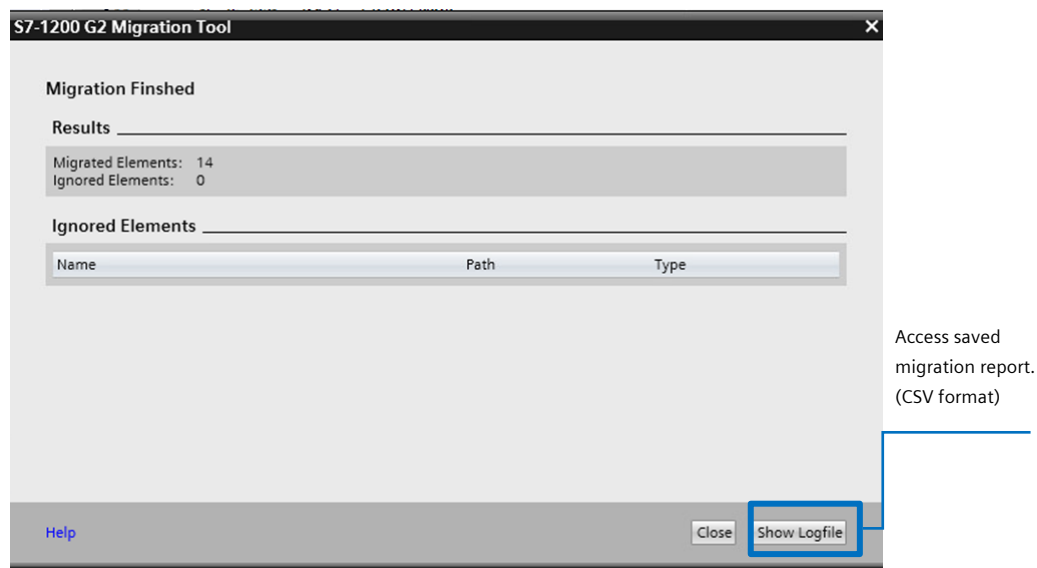


Figure 3-3: Migration Tool Results

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. Hardware properties

In case of adjusted hardware properties on the S7-1200 PLC or connected IO-Modules a manual check and change is recommended. The Add-In does not read out properties, for the onboard periphery such as properties 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 Migration Tool Add-In.

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

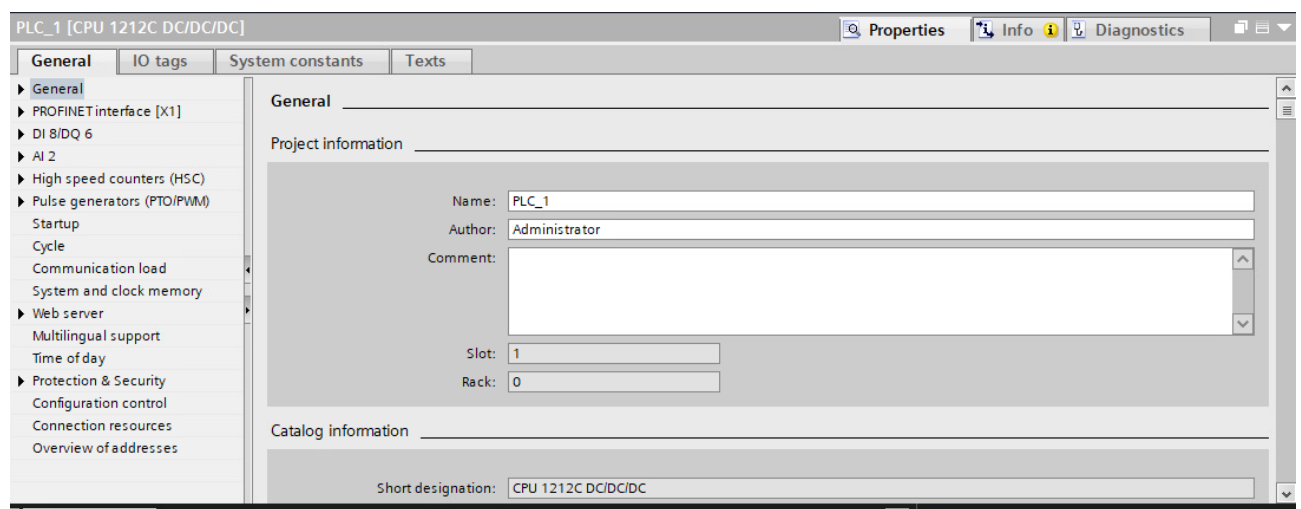


Figure 4-1: Overview HW properties on S7-1200

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	
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 of present 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 (in TIA Portal V20): 50%	
9.	System and clock memory (Default value: disabled)	

No.	Hardware properties to check	Checkbox
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 (Default 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 4-1: 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.

4.2. 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.

4.2.1. 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.

S7-1200								S7-1200 G2							
Name	Tag table	Data type	Address	Retain	Access	Write	Visibl...	Name	Tag table	Data type	Address	Retain	Access	Write	Visibl...
1 Tag_3	Default tag table	Real	%MD206					1 Tag_3	Default tag table	Real	%MD206				
2 Tag_2	Default tag table	Real	%MD204					2 Tag_2	Default tag table	Real	%MD204				
3 Tag_1	Default tag table	DWord	%MD200					3 Tag_1	Default tag table	DWord	%MD200				
4 Mtestt_Byte(1)	Default tag table	Byte	%MB20					4 Mtestt_Byte(1)	Default tag table	Byte	%MB20				
5 Mtestt_Byte(1)	Default tag table	Byte	%MB12					5 Mtestt_Byte(1)	Default tag table	Byte	%MB12				
6 Mtestt_Byte	Default tag table	Byte	%MB11					6 Mtestt_Byte	Default tag table	Byte	%MB11				
7 AlwaysFALSE	Default tag table	Bool	%M10.3					7 B	Default tag table	Bool	%M2.1				
8 AlwaysTRUE	Default tag table	Bool	%M10.2					8 A	Default tag table	Bool	%M2.0				
9 DiagStatusUpdate	Default tag table	Bool	%M10.1					9 Mtestt_Byte	Default tag table	Byte	%M2.0				
10 FirstScan	Default tag table	Bool	%M10.0					10 AlwaysFALSE	Default tag table	Bool	%M1.3				
11 System_Byte	Default tag table	Byte	%MB10					11 Mtestt_Byte(1)	Default tag table	Byte	%M1.2				
12 B	Default tag table	Bool	%M2.1					12 DiagStatusUpdate	Default tag table	Bool	%M1.1				
13 A	Default tag table	Bool	%M2.0					13 FirstScan	Default tag table	Bool	%M1.0				
14 Mtestt_Byte	Default tag table	Byte	%MB2					14 System_Byte(1)	Default tag table	Byte	%MB1				
15 System_Byte(1)	Default tag table	Byte	%MB1					15 System_Byte	Default tag table	Byte	%MB1				
16 Clock_0.5Hz	Default tag table	Bool	%M0.7					16 Clock_0.5Hz	Default tag table	Bool	%M0.7				
17 Clock_0.625Hz	Default tag table	Bool	%M0.6					17 Clock_0.625Hz	Default tag table	Bool	%M0.6				
18 Clock_1Hz	Default tag table	Bool	%M0.5					18 Clock_1Hz	Default tag table	Bool	%M0.5				
19 Clock_1.25Hz	Default tag table	Bool	%M0.4					19 Clock_1.25Hz	Default tag table	Bool	%M0.4				
20 Clock_2Hz	Default tag table	Bool	%M0.3					20 Clock_2Hz	Default tag table	Bool	%M0.3				
21 Clock_2.5Hz	Default tag table	Bool	%M0.2					21 Clock_2.5Hz	Default tag table	Bool	%M0.2				
22 Clock_5Hz	Default tag table	Bool	%M0.1					22 Clock_5Hz	Default tag table	Bool	%M0.1				
23 Clock_10Hz	Default tag table	Bool	%M0.0					23 Clock_10Hz	Default tag table	Bool	%M0.0				
24 Clock_Byte	Default tag table	Byte	%MB0					24 Clock_Byte	Default tag table	Byte	%MB0				
25 IntTag	Default tag table	Int	%QW80					25 IntTag	Default tag table	Int	%QW80				
26 Y127	Default tag table	Bool	%Q15.7					26 Y127	Default tag table	Bool	%Q15.7				
27 Y126	Default tag table	Bool	%Q15.6					27 Y126	Default tag table	Bool	%Q15.6				
28 Y125	Default tag table	Bool	%Q15.5					28 Y125	Default tag table	Bool	%Q15.5				
29 Y124	Default tag table	Bool	%Q15.4					29 Y124	Default tag table	Bool	%Q15.4				
30 Y123	Default tag table	Bool	%Q15.3					30 Y123	Default tag table	Bool	%Q15.3				
31 Y122	Default tag table	Bool	%Q15.2					31 Y122	Default tag table	Bool	%Q15.2				
32 Y121	Default tag table	Bool	%Q15.1					32 Y121	Default tag table	Bool	%Q15.1				
33 Y120	Default tag table	Bool	%Q15.0					33 Y120	Default tag table	Bool	%Q15.0				
34 Y119	Default tag table	Bool	%Q14.7					34 Y119	Default tag table	Bool	%Q14.7				
35 Y118	Default tag table	Bool	%Q14.6					35 Y118	Default tag table	Bool	%Q14.6				
36 Y117	Default tag table	Bool	%Q14.5					36 Y117	Default tag table	Bool	%Q14.5				
37 Y116	Default tag table	Bool	%Q14.4					37 Y116	Default tag table	Bool	%Q14.4				
38 Y115	Default tag table	Bool	%Q14.3					38 Y115	Default tag table	Bool	%Q14.3				
39 Y114	Default tag table	Bool	%Q14.2					39 Y114	Default tag table	Bool	%Q14.2				
40 Y113	Default tag table	Bool	%Q14.1					40 Y113	Default tag table	Bool	%Q14.1				
41 Y112	Default tag table	Bool	%Q14.0					41 Y112	Default tag table	Bool	%Q14.0				
42 Y111	Default tag table	Bool	%Q13.9					42 Y111	Default tag table	Bool	%Q13.9				
43 Y110	Default tag table	Bool	%Q13.6					43 Y110	Default tag table	Bool	%Q13.5				
44 Y109	Default tag table	Bool	%Q13.5					44 Y109	Default tag table	Bool	%Q13.5				
45 Y108	Default tag table	Bool	%Q13.4					45 Y108	Default tag table	Bool	%Q13.4				
46 Y107	Default tag table	Bool	%Q13.3					46 Y107	Default tag table	Bool	%Q13.3				

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.

4.2.2. Copy Protection

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

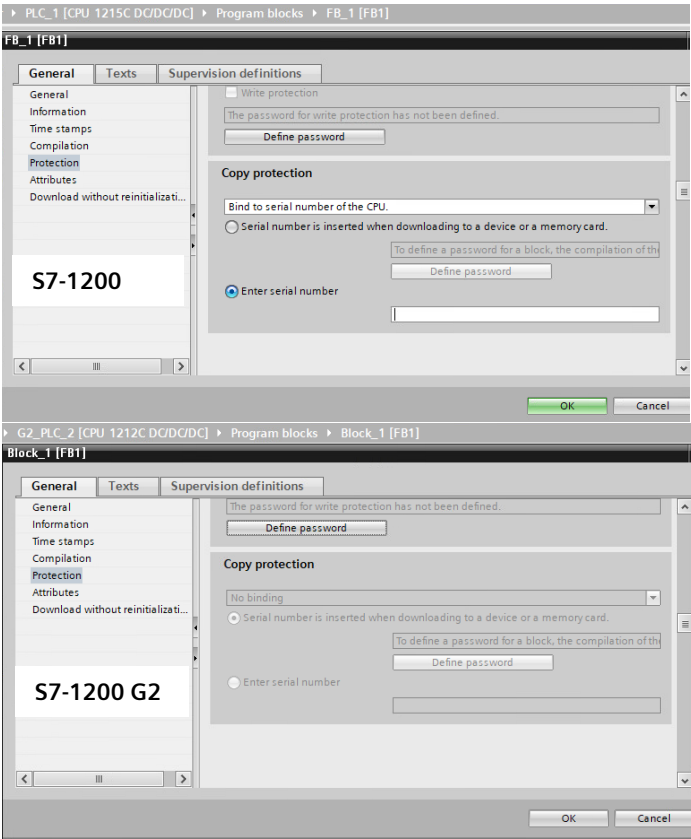


Figure 4-3: Copy protection

A suitable workaround 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>

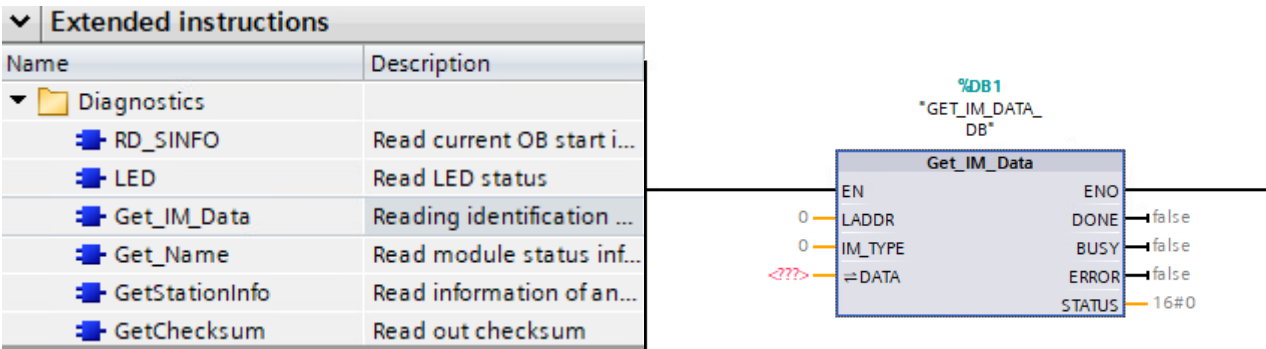


Figure 4-4: Get_IM_Data to read serial number of PLC

4.2.3. Control High-Speed 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.

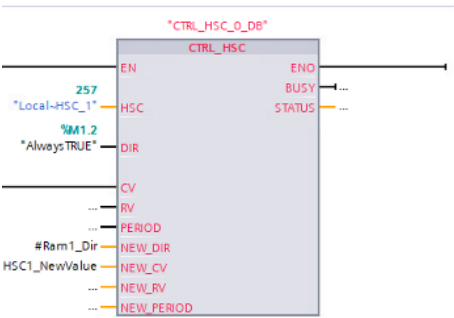


Figure 4-5: High-Speed counter functionality

Solution:

You can replace it with a simpler function CTRL_HSC_EXT.

Technology		
Name	Description	Version
Counting		V1.1
CTRL_HSC_EXT	Extended high-speed counter	V1.0
PID Control		
Motion Control		V8.0
SINAMICS Motion Control		V3.2
Time-based IO		V4.0

Figure 4-6: Control High-Speed counter extended instruction

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

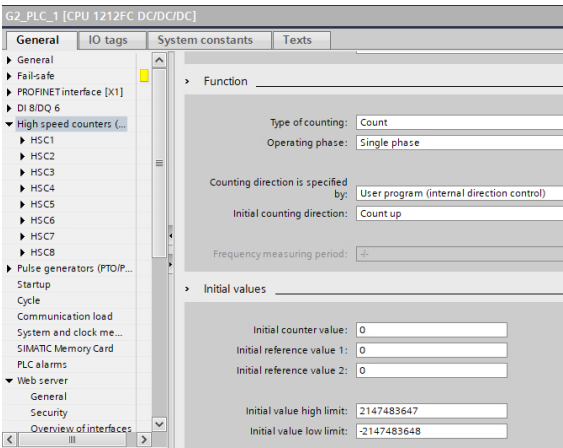


Figure 4-7: High-Speed counter configuration

Follow the instructions mentioned on TIA Portal Help page.

4.2.4. 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:

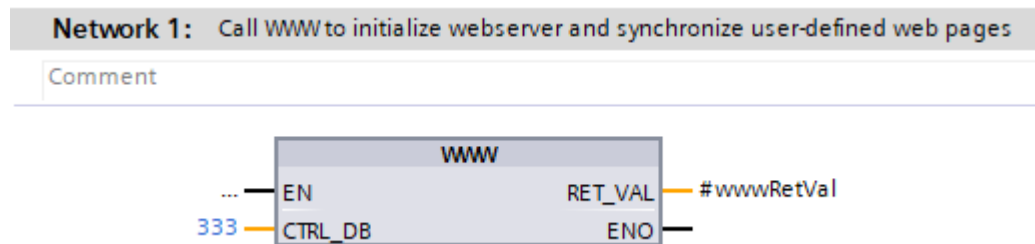


Figure 4-8: WWW Block

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 than 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.

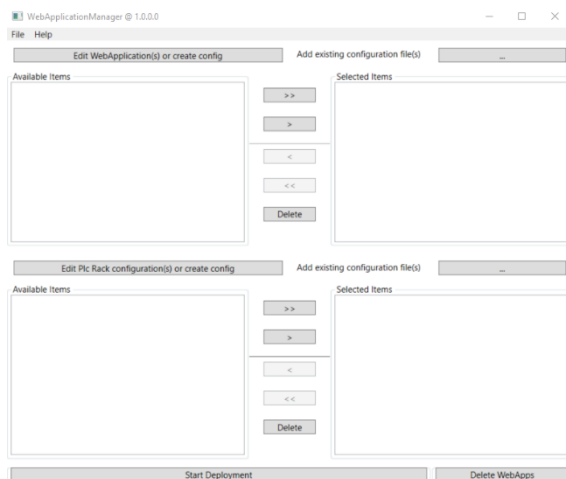


Figure 4-11: Web Application Manager (Opensource)

WebAPI Application Example:

- [Creating User-Defined Web Pages with the Web API for SIMATIC S7-1200 G2 / S7-1500](#)
- [SIMATIC S7-1200 G2 Web Server Guide](#)

4.3. 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:

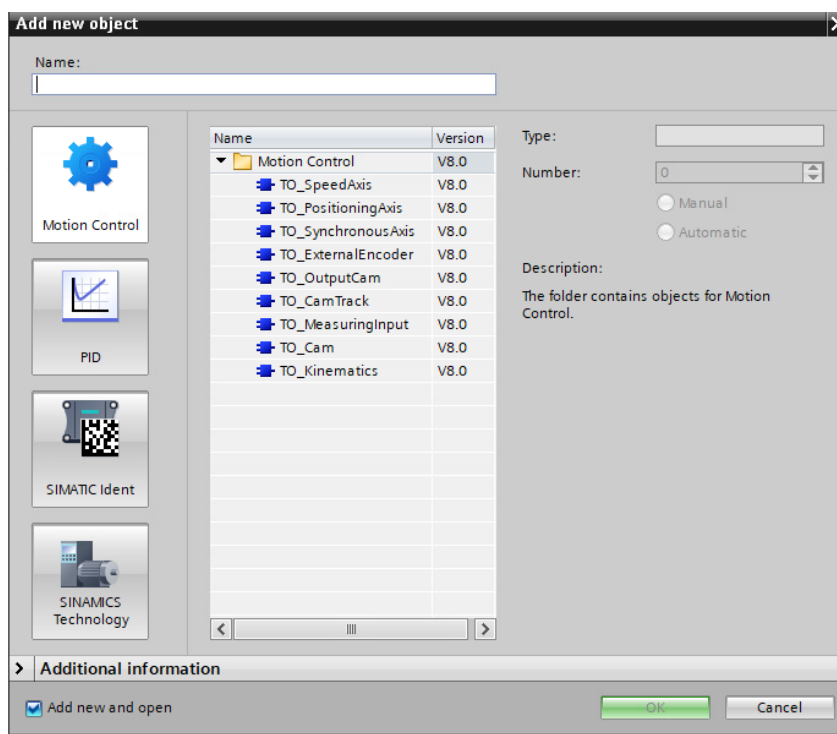


Figure 4-12: S7-1200 G2 TO catalogue

The migration Add-In can migrate existing TOs into the target PLC. It is recommended to use S7-1200 G2 Migration Tool Add-In. Check the Migration Tool Add-In document to know the supported functionalities for migration. The S7-1200 supported both motion control and motion control PTO via single position axis. Now, with added motion control functionalities motion control and PTO have their own dedicated TOs available in S7-1200 G2.

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 [Application example](#) to enable the functionality for the S7-1200 G2. Hardware configuration must be implemented manually.

4.3.1. 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.

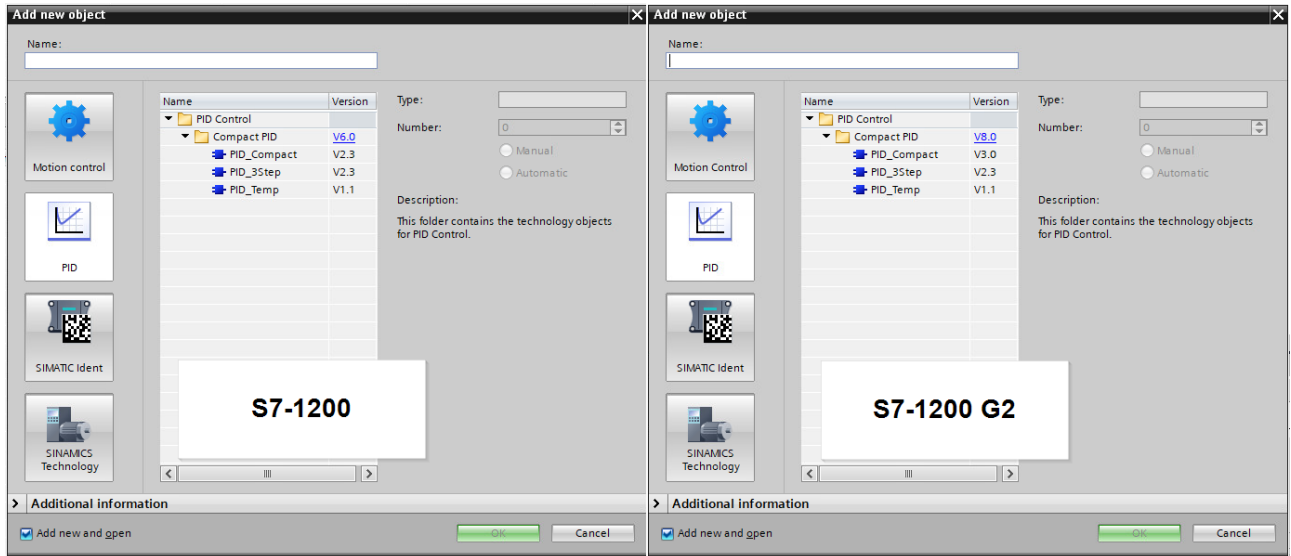


Figure 4-13: Comparison TOs for PID Control

NOTE A source file of any TO will consist of user defined parameters.

4.3.2. Motion Control 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.

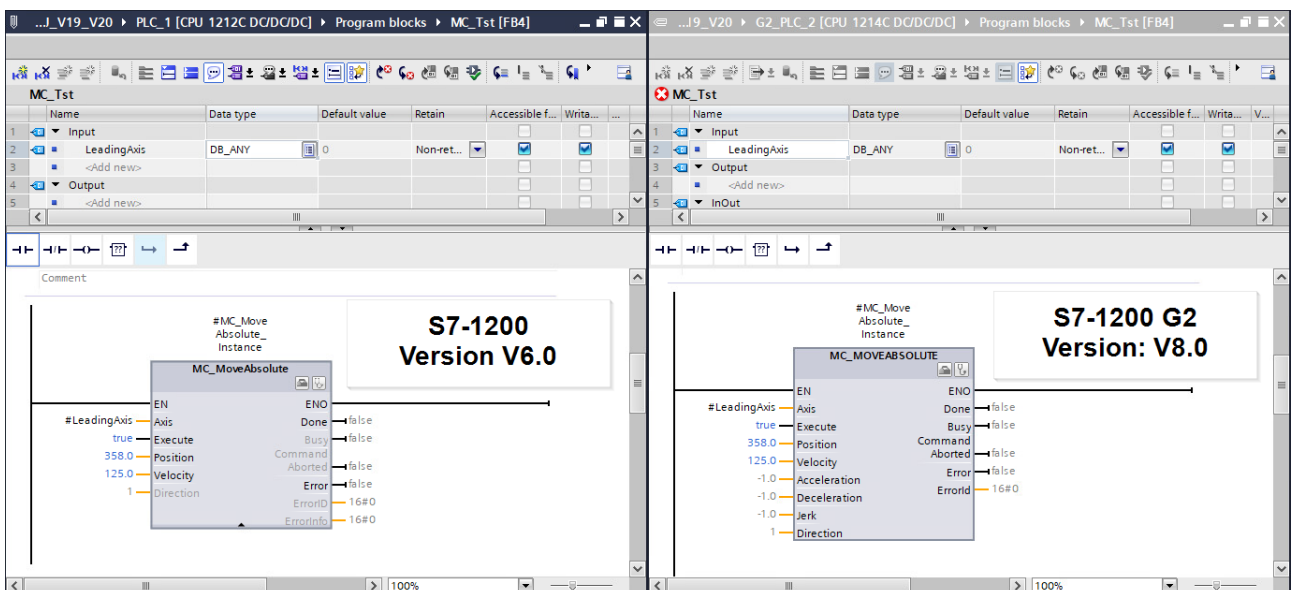


Figure 4-14: MC_MoveAbsolute interface differences between S7-1200 and S7-1200 G2

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 version V8.0 or later.

With the global search function of TIA Portal V20 or later 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.

4.3.3. TO_PositioningAxis_PTO

When using the PTO functionality, it is recommended to use the latest Firmware version available. To check for the recent firmware use [SiePortal](#).

4.4. HMI connections / tags

4.4.1. 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.

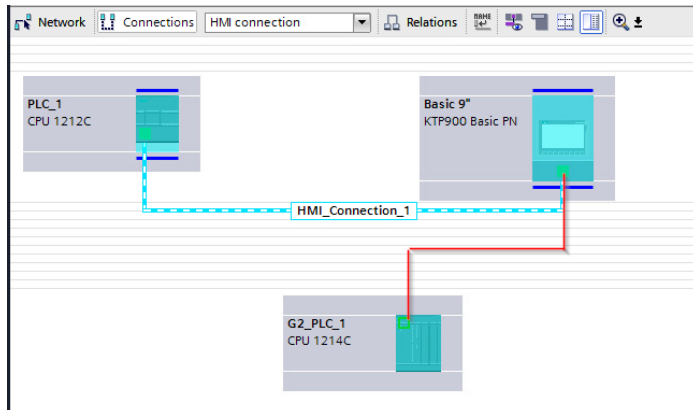


Figure 4-15: Device and Network View

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

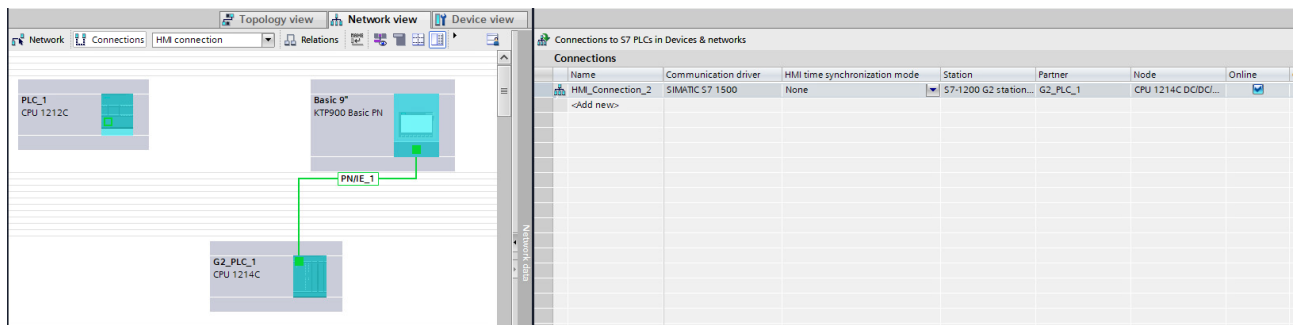
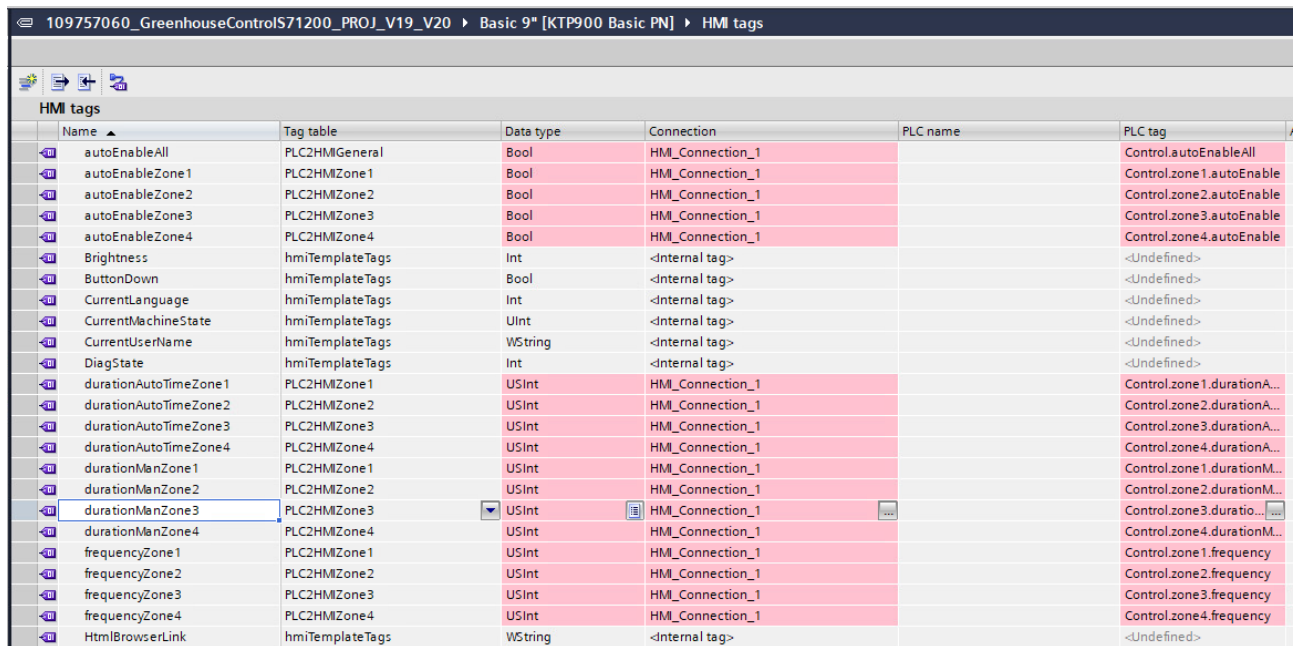


Figure 4-16: Re-established HMI-connection

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 [4.4.2](#).

4.4.2. 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.



Name	Tag table	Data type	Connection	PLC name	PLC tag
autoEnableAll	PLC2HMIGeneral	Bool	HMI_Connection_1		Control.autoEnableAll
autoEnableZone1	PLC2HMIZone1	Bool	HMI_Connection_1		Control.zone1.autoEnable
autoEnableZone2	PLC2HMIZone2	Bool	HMI_Connection_1		Control.zone2.autoEnable
autoEnableZone3	PLC2HMIZone3	Bool	HMI_Connection_1		Control.zone3.autoEnable
autoEnableZone4	PLC2HMIZone4	Bool	HMI_Connection_1		Control.zone4.autoEnable
Brightness	hmiTemplateTags	Int	<Internal tag>		<Undefined>
ButtonDown	hmiTemplateTags	Bool	<Internal tag>		<Undefined>
CurrentLanguage	hmiTemplateTags	Int	<Internal tag>		<Undefined>
CurrentMachineState	hmiTemplateTags	UInt	<Internal tag>		<Undefined>
CurrentUserName	hmiTemplateTags	WString	<Internal tag>		<Undefined>
DiagState	hmiTemplateTags	Int	<Internal tag>		<Undefined>
durationAutoTimeZone1	PLC2HMIZone1	USInt	HMI_Connection_1		Control.zone1.durationA...
durationAutoTimeZone2	PLC2HMIZone2	USInt	HMI_Connection_1		Control.zone2.durationA...
durationAutoTimeZone3	PLC2HMIZone3	USInt	HMI_Connection_1		Control.zone3.durationA...
durationAutoTimeZone4	PLC2HMIZone4	USInt	HMI_Connection_1		Control.zone4.durationA...
durationManZone1	PLC2HMIZone1	USInt	HMI_Connection_1		Control.zone1.durationM...
durationManZone2	PLC2HMIZone2	USInt	HMI_Connection_1		Control.zone2.durationM...
durationManZone3	PLC2HMIZone3	USInt	HMI_Connection_1		Control.zone3.duratio...
durationManZone4	PLC2HMIZone4	USInt	HMI_Connection_1		Control.zone4.durationM...
frequencyZone1	PLC2HMIZone1	USInt	HMI_Connection_1		Control.zone1.frequency
frequencyZone2	PLC2HMIZone2	USInt	HMI_Connection_1		Control.zone2.frequency
frequencyZone3	PLC2HMIZone3	USInt	HMI_Connection_1		Control.zone3.frequency
frequencyZone4	PLC2HMIZone4	USInt	HMI_Connection_1		Control.zone4.frequency
HtmlBrowserLink	hmiTemplateTags	WString	<Internal tag>		<Undefined>

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](#).

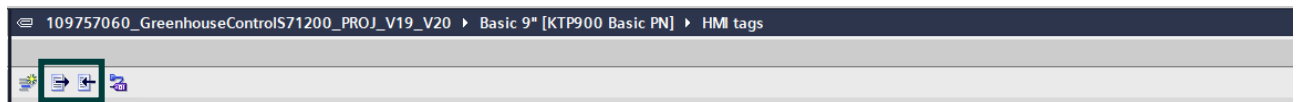


Figure 4-18: Import/export function in tool bar

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.

4.5. 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.

4.6. 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.

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".

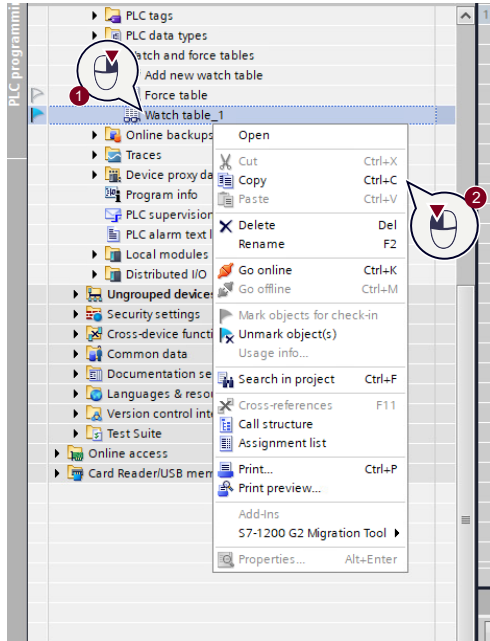


Figure 4-19: Transferring Watch Tables

- 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.

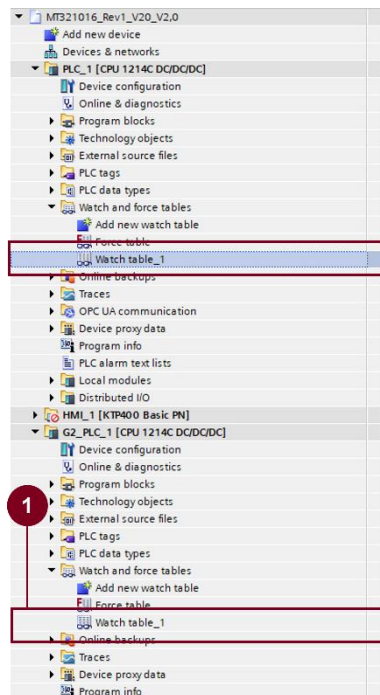
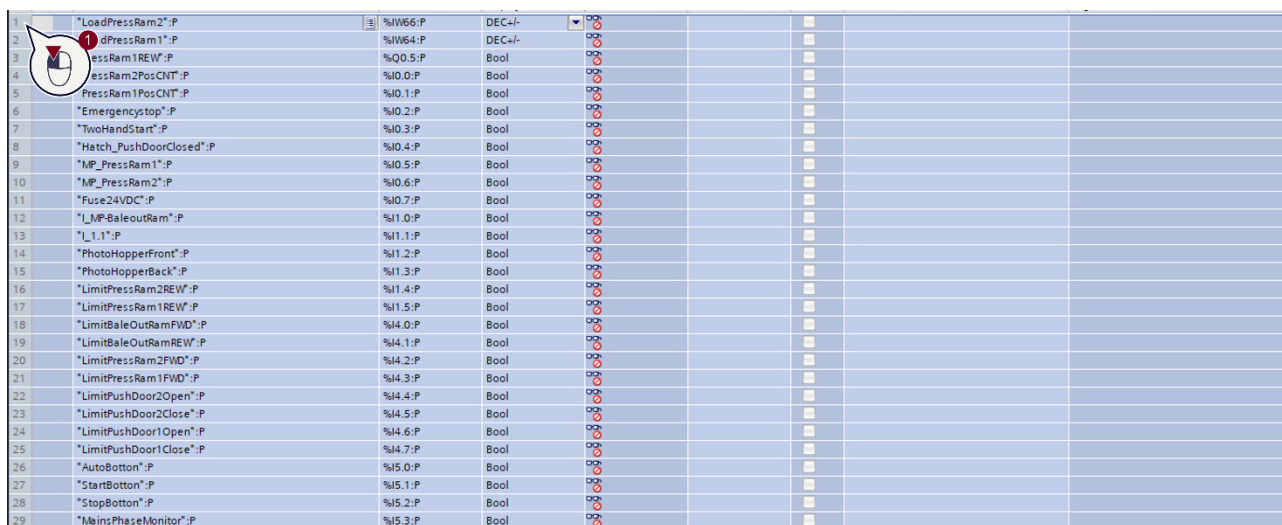


Figure 4-20: Transferring watch table to target PLC

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 must press the button shift and the down arrow on the keyboard to select the rest of the elements.



1	"LoadPressRam2":P	%W66:P	DEC+/-				
2	"dPressRam1":P	%W64:P	DEC+/-				
3	"essRam1REW":P	%Q0.5:P	Bool				
4	"essRam2PosCNT":P	%I0.0:P	Bool				
5	"PressRam1PosCNT":P	%I0.1:P	Bool				
6	"Emergencystop":P	%I0.2:P	Bool				
7	"TwoHandStart":P	%I0.3:P	Bool				
8	"Hatch_PushDoorClosed":P	%I0.4:P	Bool				
9	"MP_PressRam1":P	%I0.5:P	Bool				
10	"MP_PressRam2":P	%I0.6:P	Bool				
11	"Fuse24VDC":P	%I0.7:P	Bool				
12	"L_MP-BaleoutRam":P	%I1.0:P	Bool				
13	"L_1.1":P	%I1.1:P	Bool				
14	"PhotoHopperFront":P	%I1.2:P	Bool				
15	"PhotoHopperBack":P	%I1.3:P	Bool				
16	"LimitPressRam2REW":P	%I1.4:P	Bool				
17	"LimitPressRam1REW":P	%I1.5:P	Bool				
18	"LimitBaleOutRamFWD":P	%I4.0:P	Bool				
19	"LimitBaleOutRamREW":P	%I4.1:P	Bool				
20	"LimitPressRam2FWD":P	%I4.2:P	Bool				
21	"LimitPressRam1FWD":P	%I4.3:P	Bool				
22	"LimitPushDoor2Open":P	%I4.4:P	Bool				
23	"LimitPushDoor2Close":P	%I4.5:P	Bool				
24	"LimitPushDoor1Open":P	%I4.6:P	Bool				
25	"LimitPushDoor1Close":P	%I4.7:P	Bool				
26	"AutoBotton":P	%I5.0:P	Bool				
27	"StartBotton":P	%I5.1:P	Bool				
28	"StopBotton":P	%I5.2:P	Bool				
29	"MainsPhaseMonitor":P	%I5.3:P	Bool				

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
\2\	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
\5\	Programming Guideline Safety for SIMATIC S7-1200/1500 https://support.industry.siemens.com/cs/ww/en/view/109750255
\6\	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
V1.3	05/2026	Updated information about Migration Tool Add-In Updated Hardware release information Updated information related to migration of motion control functionalities Added link to freemium section of SITRAIN access learning content Updated current functionality available of S7-1200 G2