SIEMENS

Shared Device with CPU S7-400F and SINAMICS

STEP 7 Safety Advanced V13 SP1

http://support.automation.siemens.com/WW/view/en/BID

This entry is from the Siemens Industry Online Support. The general terms of use (http://www.siemens.com/terms_of_use) apply.

Contents

1 Introduction

What is this about?

This FAQ response answers the following question:

How do you achieve Shared Device with CPU S7-400F and SINAMICS with drive-based Safety (configured PROFIsafe messages) in the TIA Portal with SIMATIC Safety Advanced V13 SP1 and higher?

Restriction

The information given in this FAQ response refers to use of the following components.

- Standard and fail-safe S7-400 CPUs (via integrated PN interface or via CM). Here it is mandatory that for all the F-CPUs and their IOs that are part of the Shared Device configuration
  - the whole F-IO must be assigned to one F-CPU and
  - all other controllers must be Standard CPUs (or F-CPUs with F activation switched off).
- SINAMICS
  - Configured via GSD
  - Commissioning via Engineering System STARTER

Note	The latest versions of STARTER are available here: http://support.automation.siemens.com/WW/view/en/26233208

Shared Device with F-IO

With Shared Device different controllers access one IO device and share the (sub) modules of the IO device.

With STEP 7 Safety Advanced V13 SP1 and higher access can also be made to a SINAMICS with drive-based Safety.

A standard and a fail-safe controller (F-CPU) with Safety program are used:

Figure 1-1 Shared Device with Standard/F-CPUs S7-400 and SINAMICS S120
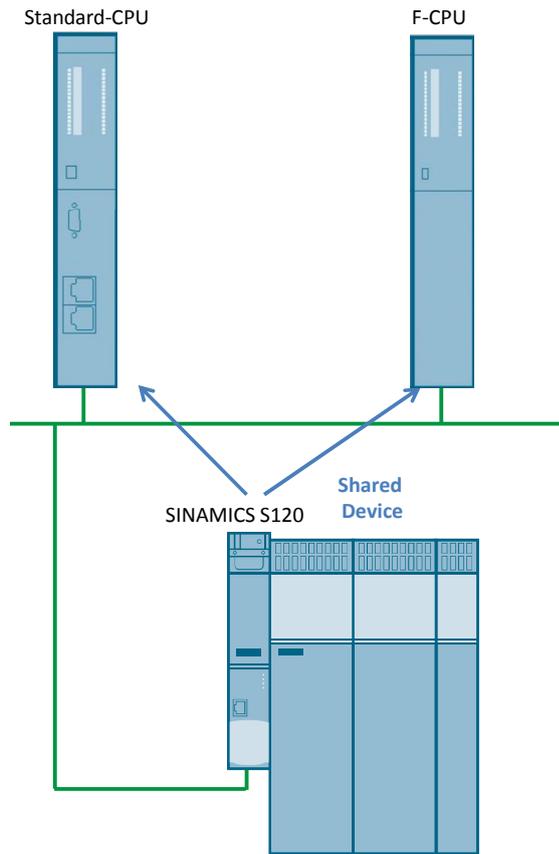
Note	As an alternative to a Standard CPU S7-400 you can also use an F-CPU S7-400 with F activation switched off.

2 Requirements

The following requirements must be fulfilled to achieve Shared Device with STEP 7 Safety Advanced V13 SP1 for CPU S7-400F and SINAMICS with drive-based Safety (configured PROFIsafe messages).

2.1 General Notes

Observe the specifications for Safety Engineering in the manual "SIMATIC Safety - Configuring and Programming" (see link below):

http://support.automation.siemens.com/WW/view/en/54110126

How to configure Shared Device is described in the Online Help for STEP 7. Pay close attention in particular to the following notes about calculating response times.

Setting the real-time properties

STEP 7 calculates the communication load and thus the resulting update times. To enable calculation with Shared Device configurations, in the project in which the PROFINET interface of the Shared Device is assigned to the IO controller you must enter the number of IO controllers outside the project.

Figure 2-1 Specification of the number of IO controllers outside the project
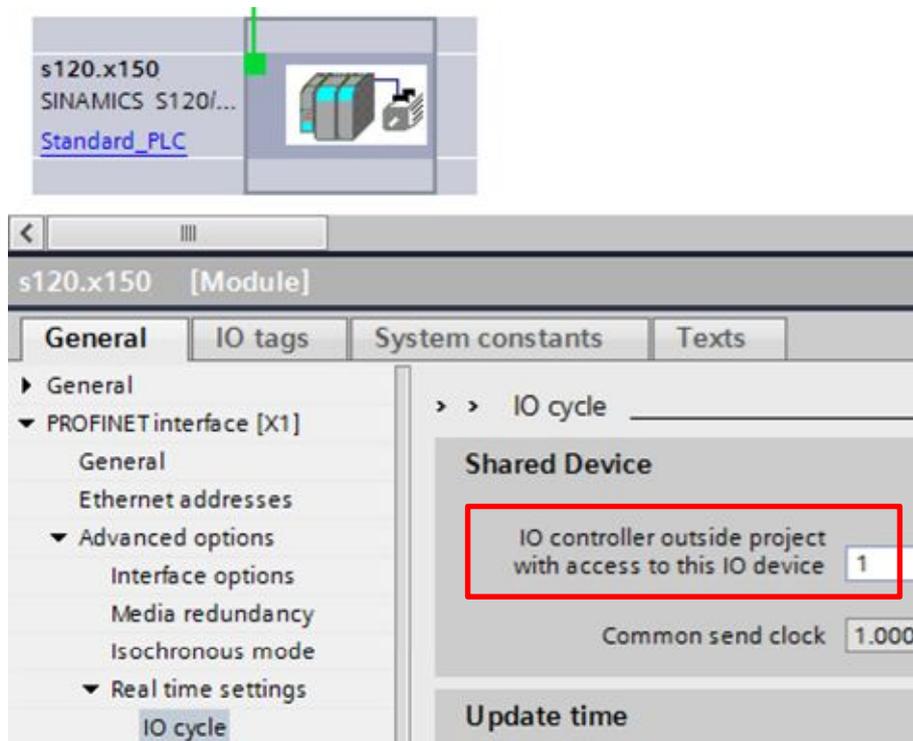
Furthermore, the following holds:

Rules for the configuration

- IO addresses of a module or submodule can only be edited if a module or submodule is assigned to the IO controller in the same project.

- The Shared Device must have the same IP parameters and the same device name in each project.

- The Send cycle clock must be the same for all IO controllers that have access to the Shared Device.

- The S7 subnet ID of the subnet to which the Shared Device is connected must be the same in all projects.

- If the PROFINET interface of the Shared Device is assigned to the local IO controller, the following functions are possible.

  - IRT mode
  - Prioritized startup
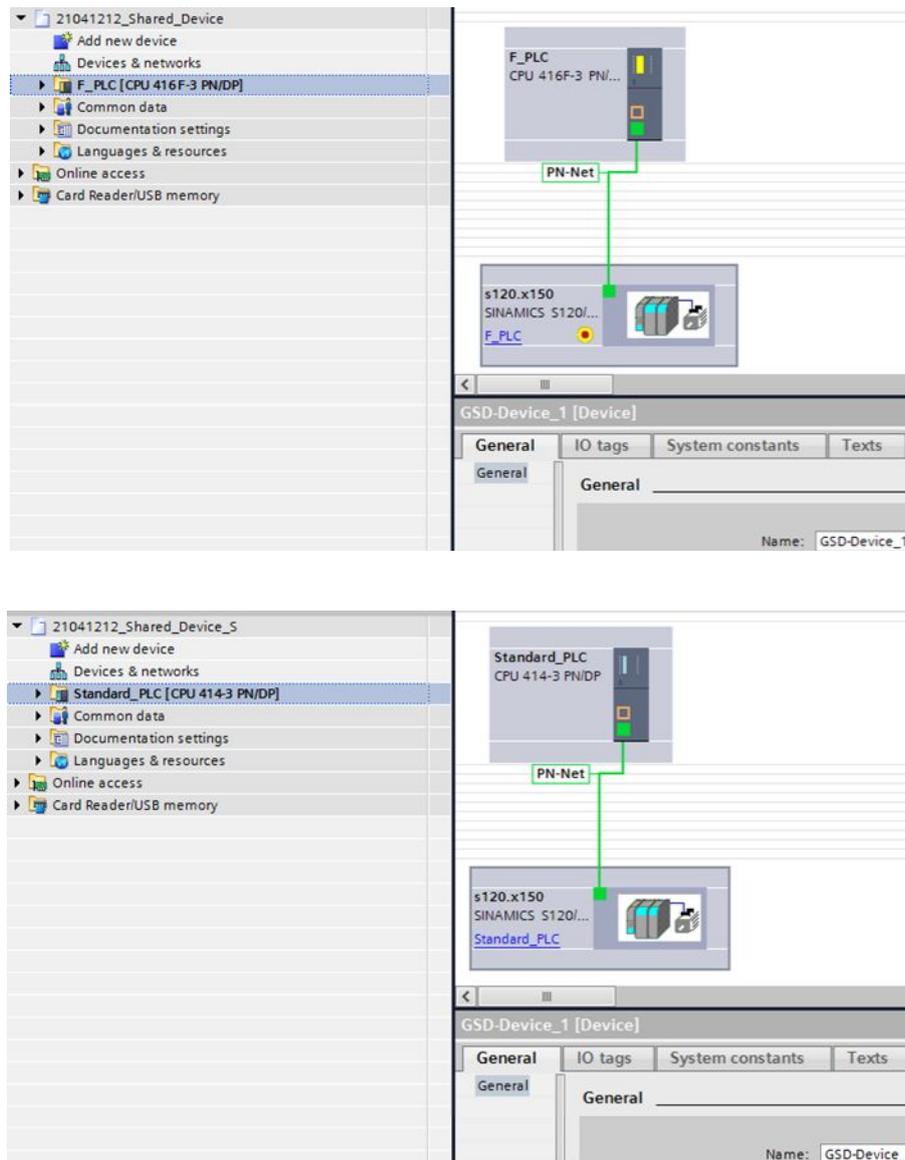 - Parameterization of the port properties

Conditions

- The address overview of each IO controller which has access to a Shared Device shows no addresses of modules or submodules that are not assigned to that IO controller.

- The non-assigned modules and submodules are not included in the quantity framework calculation for the Shared Device in the consistency check. Therefore you must check yourself that the maximum number of submodules or the maximum number of cyclic IO data for the Shared Device is not exceeded.

- Configuration errors, like the assignment of a module or submodule to multiple IO controllers, are not detected by STEP 7.

- CPUs that are loaded with a Shared Device configuration have no information about whether the IO device is a Shared Device. Modules and submodules that are assigned to other IO controllers and therefore to other CPUs are not included in the loaded configuration. These modules and submodules are therefore displayed neither in the CPU web server nor in the CPU display.

2.2 Configuration of F-CPU and F-IO

The following restrictions apply for configuring in the TIA Portal.

⚠️ WARNING	To be able to assign the IOs of an IO device to different IO controllers the IO device must be configured separately for each IO controller. Here each IO must be assigned to just one IO controller only (see Figure 2-2).
	The configuration for each IO controller is done in a separate project.
	Only one F-CPU with Safety program may access a Shared Device. All F IOs of the Shared Device must be assigned to that F-CPU. All other CPUs that access the Shared Device must be standard CPUs (or F-CPUs with F activation switched off).

Figure 2-2 Separate configuration of the IO device

After configuration of the F-CPU and SINAMICS 120 in the Hardware Configuration of STEP 7 the SINAMICS S120 is copied and assigned to the standard CPU in its project.
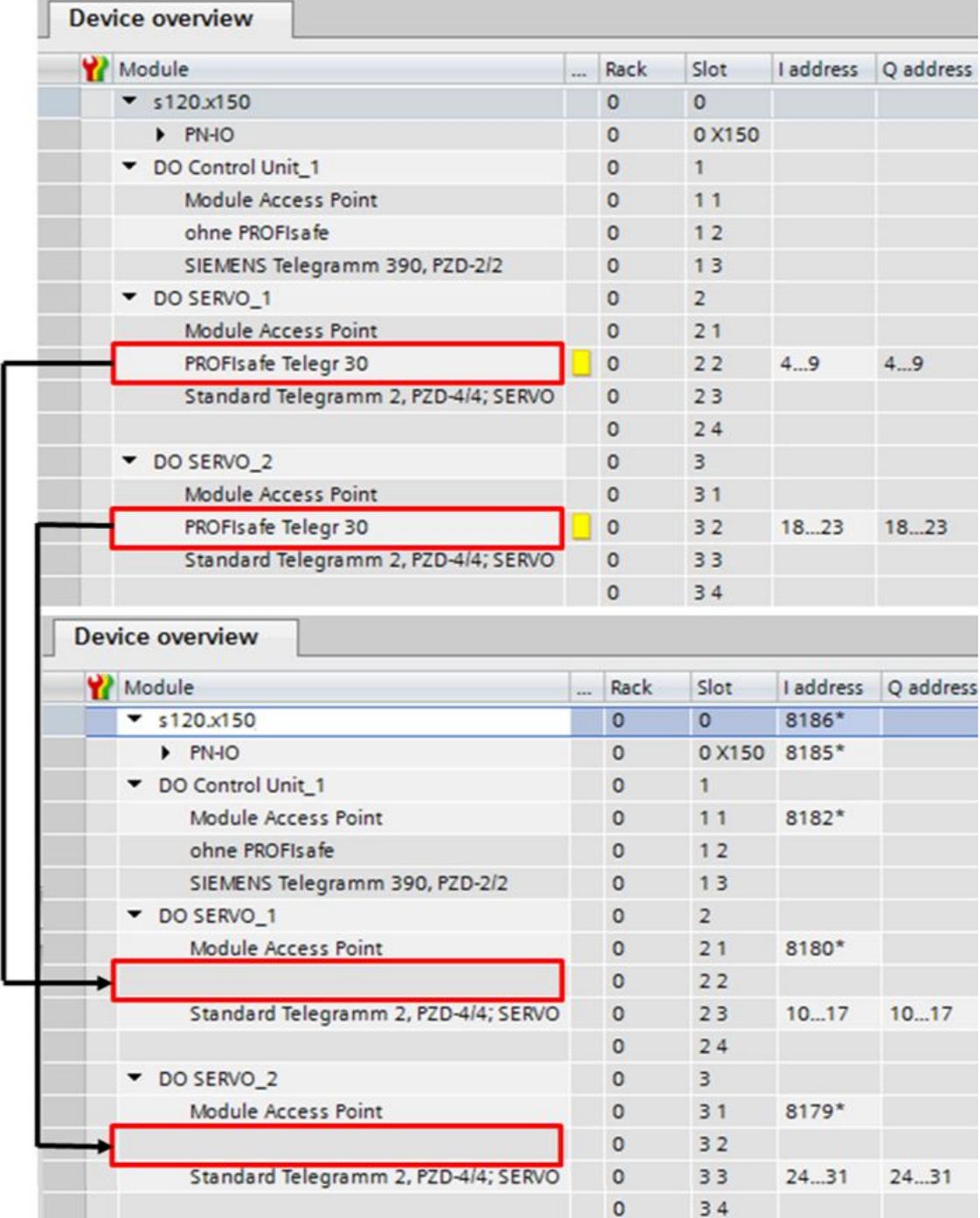
The user must ensure that the following are identical with the SINAMICS S120

- Device name
- IP addresses

The following requirement must also be met for the F-IO:

⚠ **WARNING**	The F-IO may only be configured in the project that contains the IO controller to which it is assigned. In the project of all the other IO controllers an empty space must be left instead of the F-IO or a placeholder without F function must be placed (empty submodule, for example) ([Figure 2-3](#)).

Figure 2-3 Empty spaces instead of F-IOs

Device overview

⚡ Module	...	Rack	Slot	I address	Q address
▼ s120.x150		0	0		
▶ PN-IO		0	0 X150		
▼ DO Control Unit_1		0	1		
Module Access Point		0	1 1		
ohne PROFIsafe		0	1 2		
SIEMENS Telegramm 390, PZD-2/2		0	1 3		
▼ DO SERVO_1		0	2		
Module Access Point		0	2 1		
PROFIsafe Telegr 30	🟨	0	2 2	4...9	4...9
Standard Telegramm 2, PZD-4/4; SERVO		0	2 3		
		0	2 4		
▼ DO SERVO_2		0	3		
Module Access Point		0	3 1		
PROFIsafe Telegr 30	🟨	0	3 2	18...23	18...23
Standard Telegramm 2, PZD-4/4; SERVO		0	3 3		
		0	3 4		

Device overview

⚡ Module	...	Rack	Slot	I address	Q address
▼ s120.x150		0	0	8186*	
▶ PN-IO		0	0 X150	8185*	
▼ DO Control Unit_1		0	1		
Module Access Point		0	1 1	8182*	
ohne PROFIsafe		0	1 2		
SIEMENS Telegramm 390, PZD-2/2		0	1 3		
▼ DO SERVO_1		0	2		
Module Access Point		0	2 1	8180*	
		0	2 2		
Standard Telegramm 2, PZD-4/4; SERVO		0	2 3	10...17	10...17
		0	2 4		
▼ DO SERVO_2		0	3		
Module Access Point		0	3 1	8179*	
		0	3 2		
Standard Telegramm 2, PZD-4/4; SERVO		0	3 3	24...31	24...31
		0	3 4		

In the view of the "General" tab the F slots are no longer in the corresponding places; the empty spaces are not visible here (see next figures).

Figure 2-4 F slots of the device (SINAMICS S120) assigned to the F-CPU

Figure 2-5 No F slots of the device (SINAMICS S120) assigned to the standard CPU

2.3　Unique Assignment of the PROFIsafe Address

The IEC 61784-3-3:2012 requires the PROFIsafe address to be unique.

Each F-IO is uniquely addressed via the PROFIsafe address. The PROFIsafe address consists of the F source address and the F destination address.

The F-IO in SINAMICS devices only uses the F destination address to ensure that the PROFIsafe address is unique (PROFIsafe address type 1).

⚠ **WARNING**	F-IO of the PROFIsafe address type 1 is addressed uniquely through its F destination address. The following rules ensure that the F destination addresses are unique. The F destination address of the F-IO must be unique network-wide* and CPU-wide** (system-wide) **for the entire** F-IO. Here you must also take into account F-IOs of PROFIsafe address type 2. For each F-IO you must use the Safety printout to check that the F destination address of an F-IO configured in a Shared Device is unique.

* A network consists of one or more subnets. "Network-wide" means across subnet boundaries. With PROFIBUS a network comprises all the nodes that can be accessed via PROFIBUS DP. With PROFINET IO a network includes all the nodes that can be accessed via RT_Class_1/2/3 (Ethernet/WLAN/Bluetooth, Layer 2) and, where applicable, RT_Class_UDP (IP, Layer 3).

** "CPU-wide" means all the F-IOs assigned to an F-CPU: central F-IOs of this F-CPU and F-IOs for which the F-CPU is DP master/IO controller. F-IOs that are addressed by I slave-slave communication are assigned to the F-CPU of the I slave and not to the F-CPU of the DP master/IO controller.

The settings for the PROFIsafe address are in the Hardware Configuration of STEP 7.

Figure 2-6 F source address and F destination address in the Hardware Configuration of STEP 7

Detailed information about PROFIsafe addresses is available in the manual "SIMATIC Safety - Configuring and Programming" in the "Configuring" chapter (see link below):

http://support.automation.siemens.com/WW/view/en/54110126

2.4 Checking the Parameter F_Par_Version

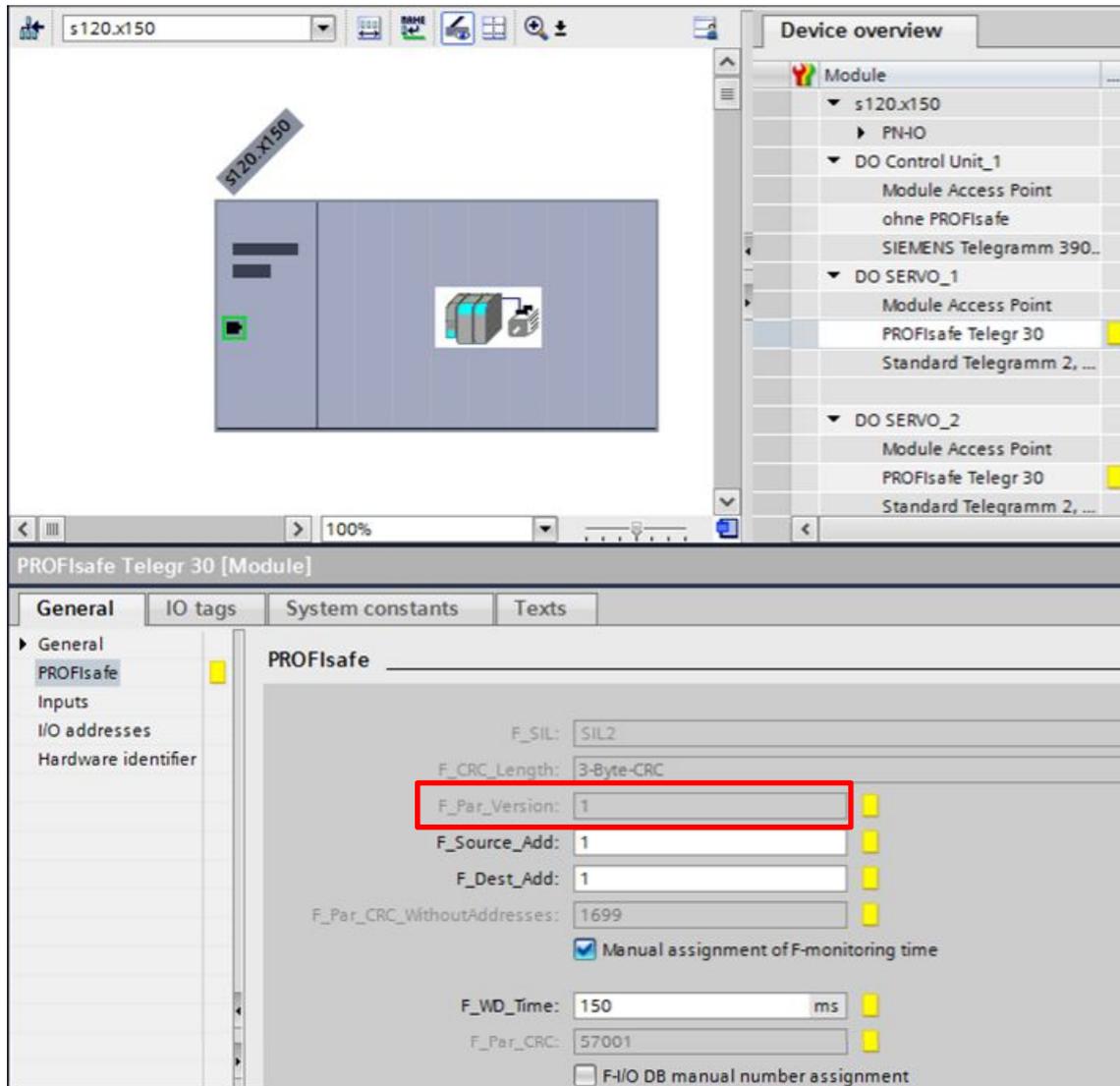| ⚠️ **WARNING**	For acceptance you must also use the Safety printout to check that the parameter PROFIsafe operating mode (F_Par_Version) is correct ([Figure 2-7](#)). In the PROFINET IO environment** the V2 mode (value "1") must be set. F-IO, which only supports V1 mode (value "0") may not be used in the PROFINET IO environment.

** F-IO is in the "PROFINET IO environment" if at least a part of the fail-safe communication to the F-CPU is via PROFINET IO. If the F-IO is connected via I slave-slave communication, you must also take into consideration the communication segment to the DP master/IO controller.

Figure 2-7 Parameter F_Par_Version in the Safety printout

PROFIsafe Telegr 30 : s120.x150, Slot 3	
General parameters	
Hardware	
Name	PROFIsafe Telegr 30
Slot	3
Short designation	PROFIsafe telegr 30
Article number	--
Start address input	18
Start address output	18
Hardware identifier	275
F_WD_Time	250 ms
F_Source_Add	1
F_Dest_Add	2
F_Par_CRC_WithoutAddresses	0x6A3 (1699)
F_Par_CRC	0xB07A (45178)
F_Passivation	Device/Module
F_Par_Version	1
F_CRC_Seed	CRC-Seed16
F_Check_iPar	NoCheck
F_Block_ID	0
F_iPar_CRC	--
F_CRC_Length	3-Byte-CRC
F_SIL	SIL2
Software	
F-I/O DB number	30003

You can also find the parameter F_Par_Version in the project under "General Properties" of the SINAMICS (here: S120) in the Hardware Configuration.

Figure 2-8 Parameter F_Par_Version in the Hardware Configuration of STEP 7

2.5 Notes for Acceptance of the System

> ⚠️ **WARNING**
>
> For system acceptance you must use a Safety printout according to the manual "SIMATIC Safety - Configuring and Programming" in the "System Acceptance" chapter (see link at the end of this section).
>
> You must also carry out the following checks in the Safety printout.
>
> - Configured F-IOs in a Shared Device may only appear in the Safety printout of the IO controller assigned to it. The Safety printout of an IO controller must not contain any F-IO that is not assigned to it.
>
> - For each F-IO in a Shared Device you have to check whether the parameter F_Par_CRC has a value greater than 0.

The manual "SIMATIC Safety - Configuring and Programming" includes more detailed information about system acceptance. Pay particular attention to the chapters "Compiling and Commissioning a Safety Program" and "System Acceptance".

http://support.automation.siemens.com/WW/view/en/54110126

3 History

Table 3-1 History

Version	Date	Type of change
V1.0	02/2015	Creation