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Quick Start Guide CS60/ID600

Profinet Integration

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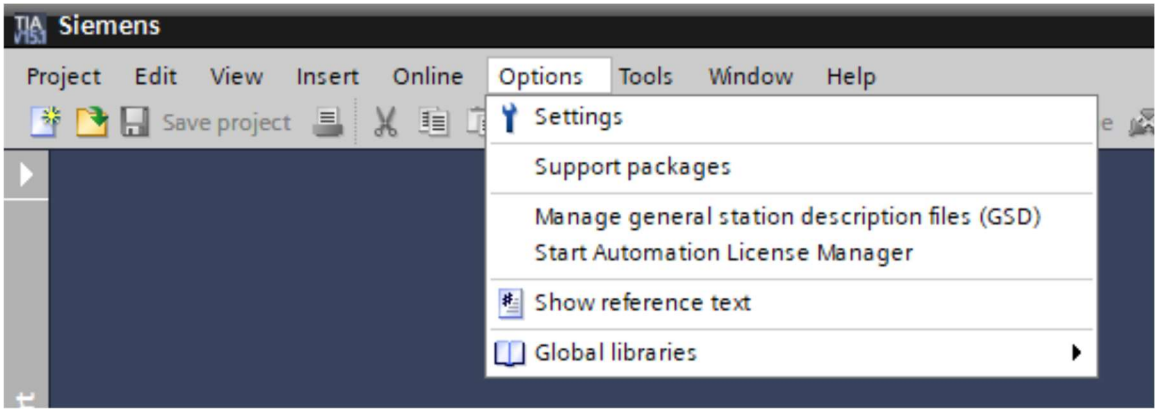
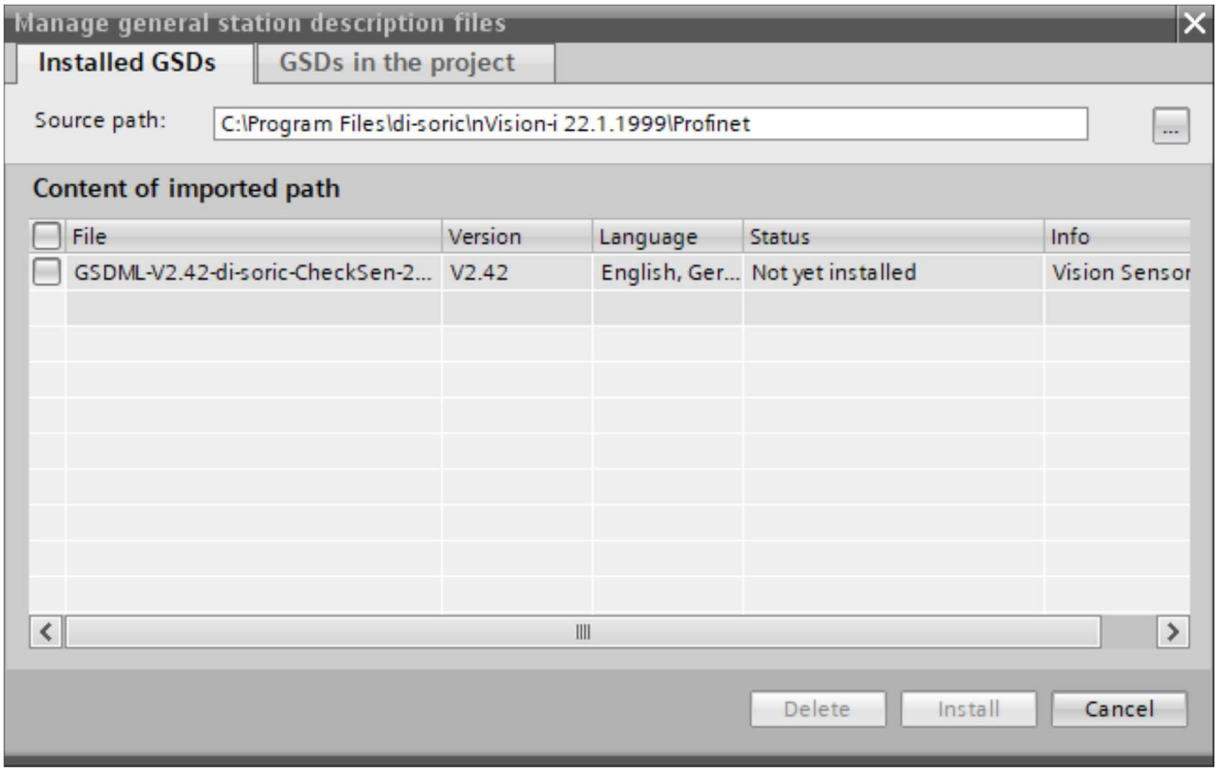
Preparation of the PLC_Import GSD

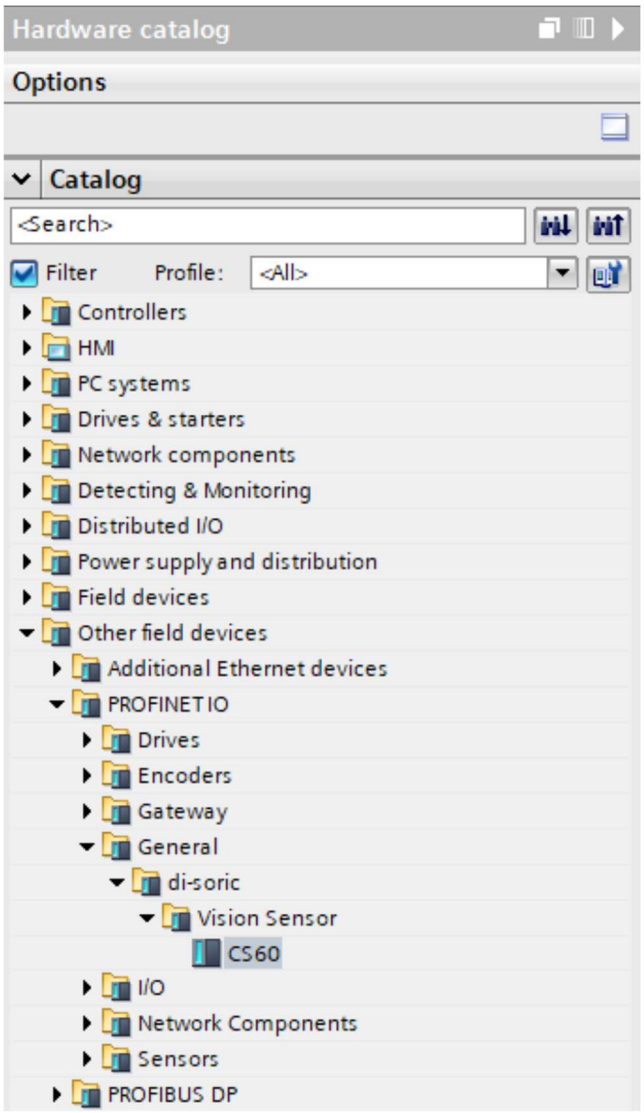
The GSD file is installed with the nVision-i software and can be added in the nVision-i installation directory **(PROGRAMME\di-soric\nVision-i\ Profinet)**.

Alternatively, the file is also available online on the di-soric homepage under each CS60/ID600 data sheet under Downloads. https://www.di-soric.com/int-en/PM/Image-processing-identification/Vision-sensors/CS-60/CS60-BM28-EP15300__212910#variant

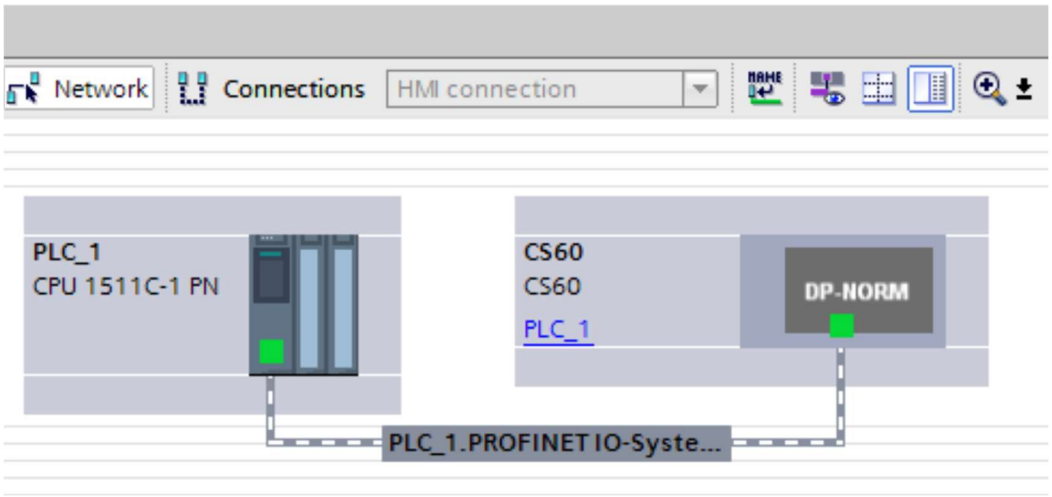




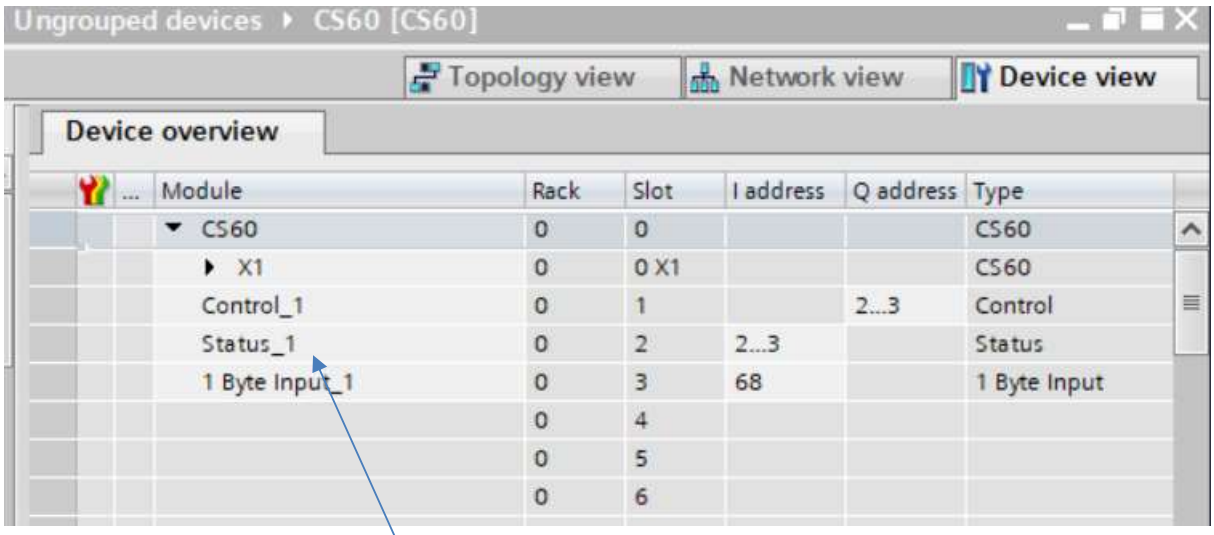
After you have added the PLC to the TIA project, add the **CS-60/ID-600** to the project. The **CS-60/ID-600** is listed in the hardware catalog, under Other field devices -> PROFINET IO -> General -> di-soric -> Vision Sensor -> CS-60/ID-600.



After the **CS-60/ID-600** device has been added, it must be connected to the PLC.

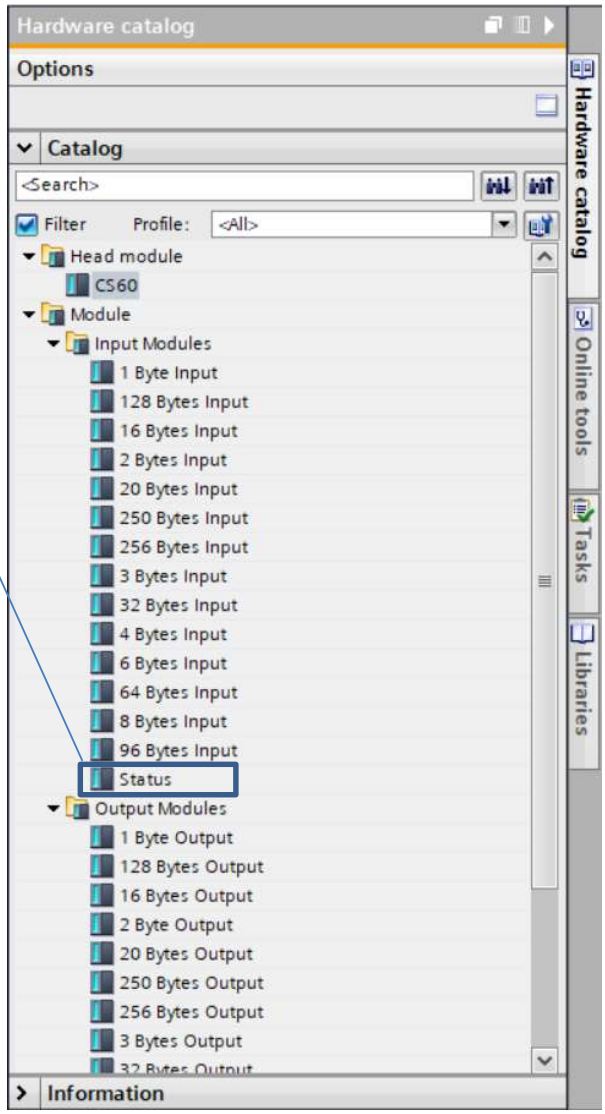


Then, you need to configure the Input and Output Modules to the slots of the **CS-60/ID-600**. Here is an example:



The control and status bytes are already available as modules in the GSD file under "Module".

Only these functions may be assigned or used to ensure correct communication with the CS60/ID600.



Standard Status and Control Signal Setup

The **CS-60/ID-600** status information is sent from the **CS-60/ID-600** to the PLC. By default, the assignment is as follows:

Byte Offset	Bits	Data	Description
0	0	Online	True if the **CS-60/ID-600** is online, false if the **CS-60/ID-600** is offline.
0	1	AckSetOnline	Acknowledge toggles of the `SetOnline` control bit.
0	2		
0	3	AckJobLoad	Acknowledge toggles of the `JobLoad` control bit.
0	4	JobLoadOk	True if a job could be loaded, false if loading failed.
0	5	Ready	True if the **CS-60/ID-600** can accept a trigger, false if it is busy.
0	6	AckTrigger	Acknowledge Trigger. True after rising edge, false after falling edge of Trigger.
1	0-7	JobId	The id of the current job (0 .. 255).

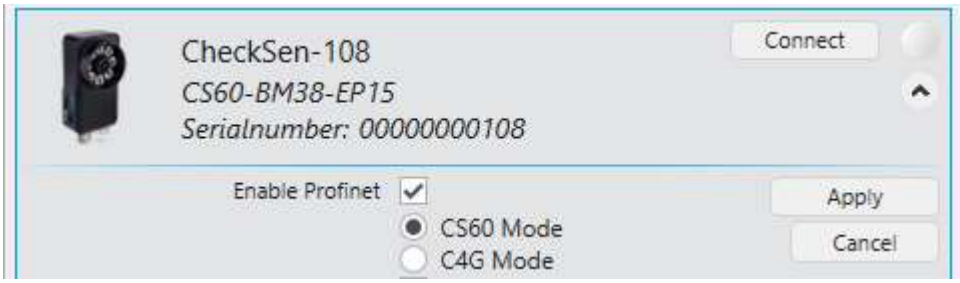
Control information is sent from the PLC to the **CS-60/ID-600**. By default, the assignment is as follows:

Byte Offset	Bits	Data	Description
0	0	SetOnline	Set to true to put the **CS-60/ID-600** online, false to put it offline.
0	1	JobLoad	Execute a job load command.
0	2	BootJob	True to make the loaded job the boot job, false otherwise.
0	3	Trigger	Trigger an acquisition.
1	0-7	JobLoadId	The id of the job that should be loaded (0 .. 255).

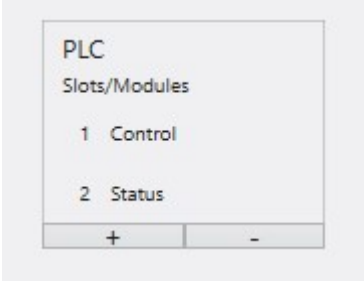
Preparation of the CS60/ID600

The following prerequisites for Profinet communication must be created in the CS60/ID600.

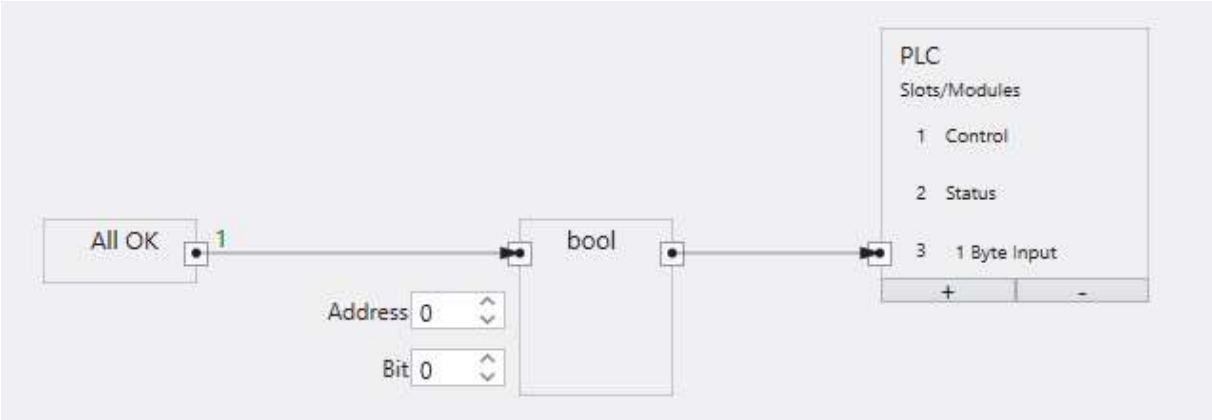
1. Activate the Profinet protocol on your CS60/ID600. This is deactivated in the delivery state.



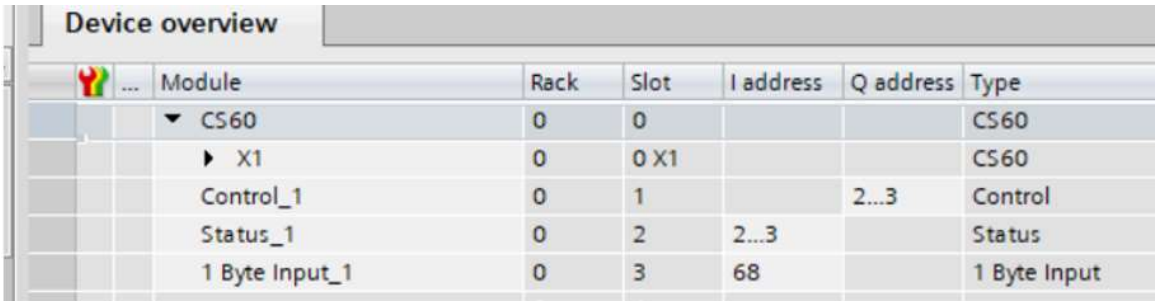
2. It is best to create a basic job in the CS60/ID600 which you can then use or copy as a template for all your other jobs. Always select the same Profinet I/O setting in the logic/profinet outputs of the CS60/ID600. The basic communication (control and status) is always present. For all other signals such as good/bad or individual data such as code content, you can add modules as required.



3. The module selection must be set exactly the same later in the PLC device overview. Only in this way is later communication possible. The following is an example with an extension by 1 byte inputs and an All OK signal on bit 0.0.

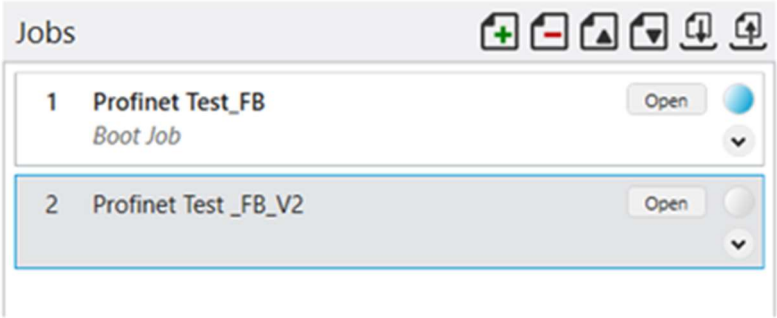


4. In the device overview of the PLC, the 1-byte input was also inserted in slot 3. The selection of the bytes and their sizes is done via the hardware catalogue. The required byte size is simply dragged in using Drag&Drop.


Device overview

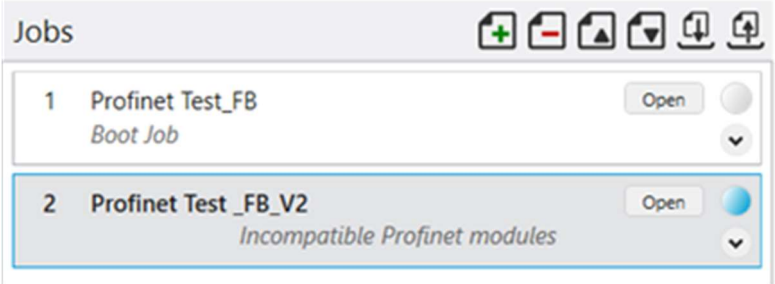
...	Module	Rack	Slot	I address	Q address	Type
	CS60	0	0			CS60
	X1	0	0 X1			CS60
	Control_1	0	1		2...3	Control
	Status_1	0	2	2...3		Status
	1 Byte Input_1	0	3	68		1 Byte Input

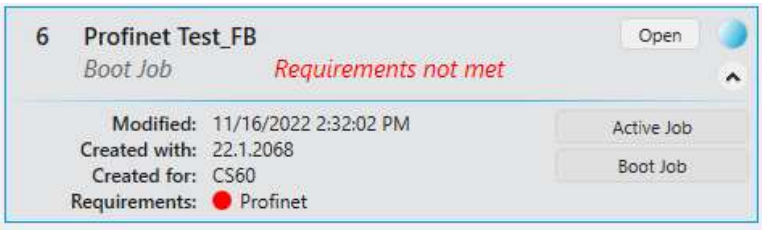
5. After transferring the settings to the PLC, the compatibility of the jobs in the CS60/ID600 can be checked via the job table in nVision-i. If all jobs in the CS60/ID600 are compatible, no messages appear.



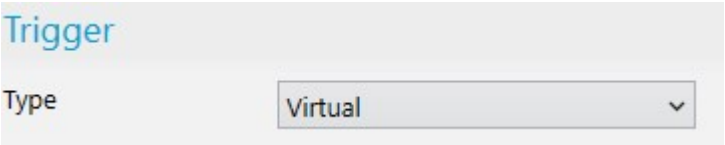
If jobs are not compatible, you will receive an error message in the affected jobs.
In such cases, please check the module settings in the affected jobs again.

Only when no error messages are displayed can you work with all jobs via Profinet without restrictions.

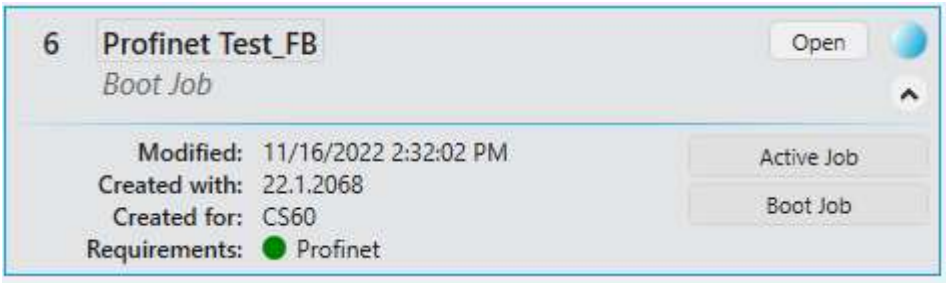




6. Please set the trigger type to "Virtual" in all jobs. If not, no Profinet trigger can be used.



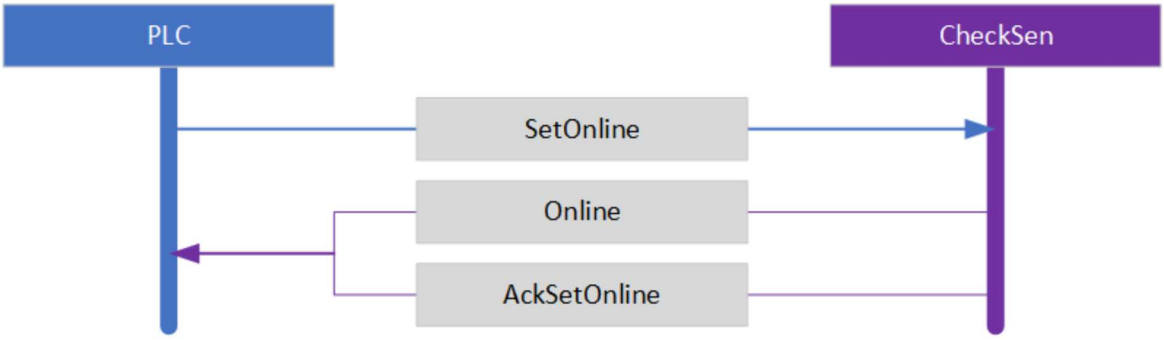
7. It is absolutely necessary to select a boot job once in the job table.
   Without the selection of a boot job, the CS60/ID600 would no longer be accessible via Profinet at the next restart. An actively loaded job is a prerequisite.



Signal Process CS60/ID600

The most important signals via Profinet between a CS60/ID600 and the PLC are explained below.

1. A bootjob is selected and loaded.
2. The CS60/ID600 must be switched online via the "SetOnline" bit.
3. Confirmation is received via the status bit "AckSetOnline" and "Online".



4. An image acquisition can then be started via the **"Trigger"** control bit.
   Provided the status bit **"Ready"** is set and the trigger type **"Virtual"** is selected in nVision-i.

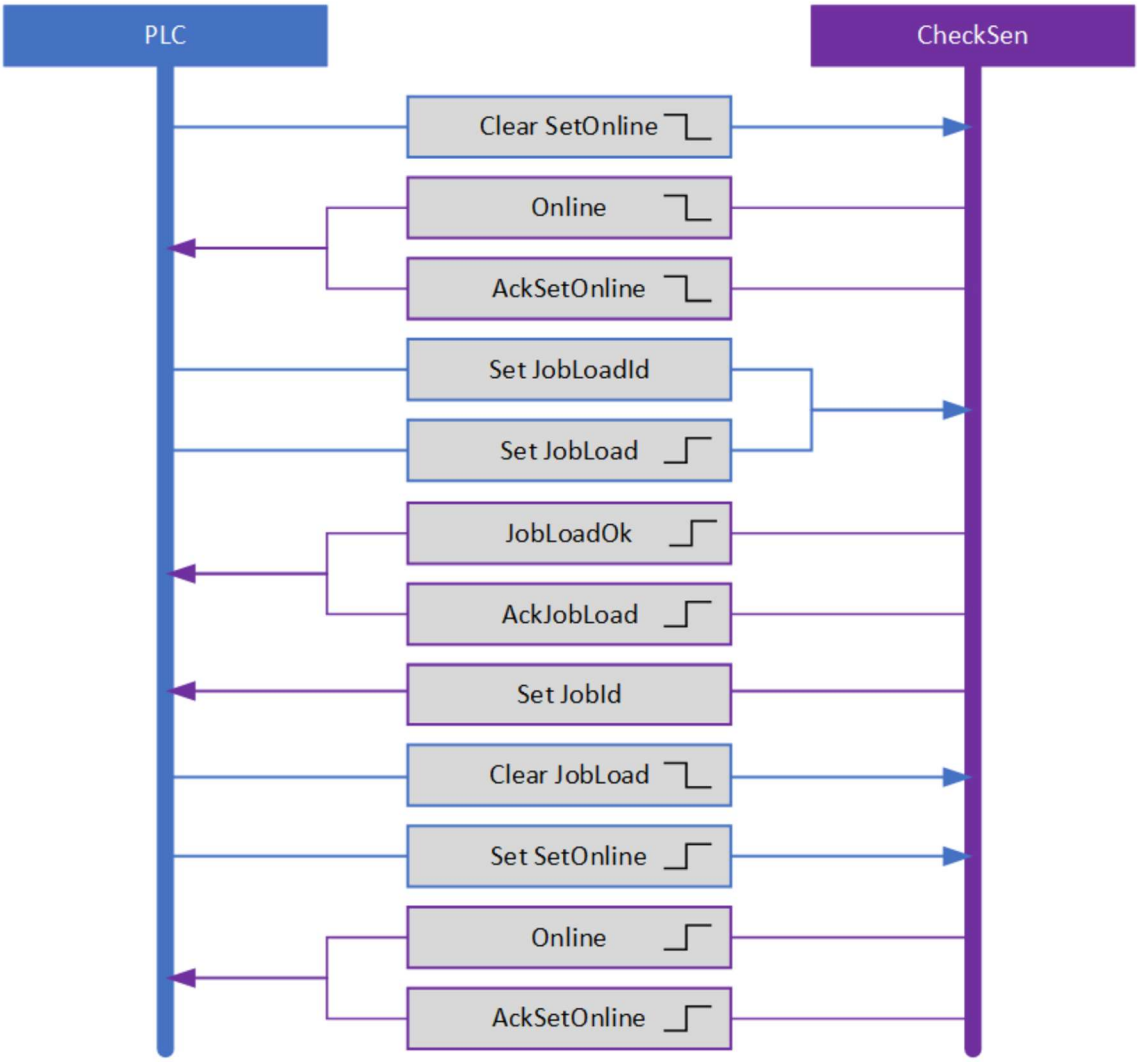
   As confirmation of the trigger, the status bit **"AckTrigger"** is set and **"Ready"** is false during image acquisition and image evaluation.

   The next image capture is only possible with a pending **"Ready".**

5. For a job change, the CS60/ID600 must be switched offline by deactivating the control bit **"SetOnline".**
   Then a job number can be selected via the control byte **"JobLoadID"** (1-255). Then the job change is controlled via the **"JobLoad"** control bit.

   For each command there is an additional handshake bit as confirmation.

   The exact procedure can be seen in the following graphic.

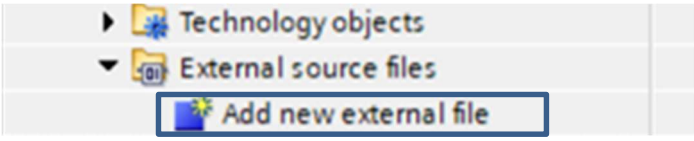


di-soric offers customers the option of integrating the CS60/ID600 into Profinet via a function block. This is available as a download on the homepage for Siemens controllers of the 1200/1500 series from Tia V15.1. Please open a CS60/ID600 data sheet and select the download tab.

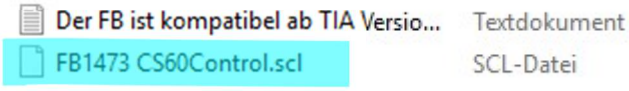
https://www.di-soric.com/int-de/file-download/object_file_59624_de

Inserting an external source

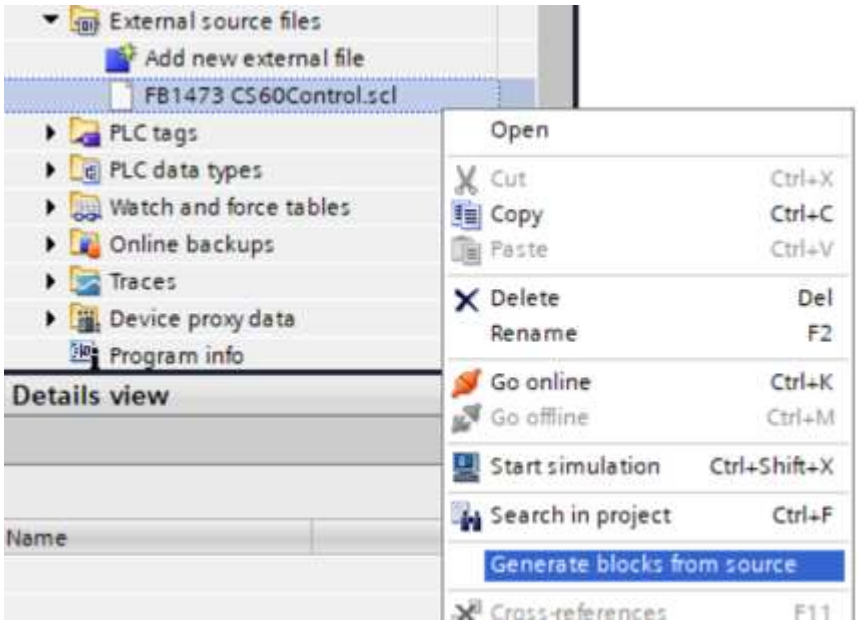
1. Add new external file.



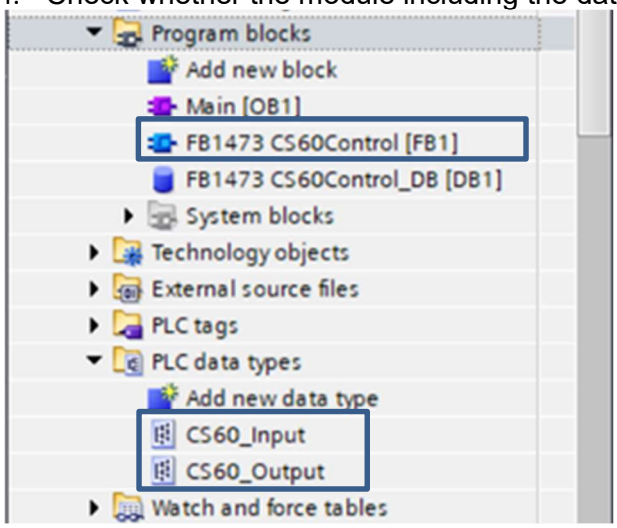
2. Selecting the file after unpacking.



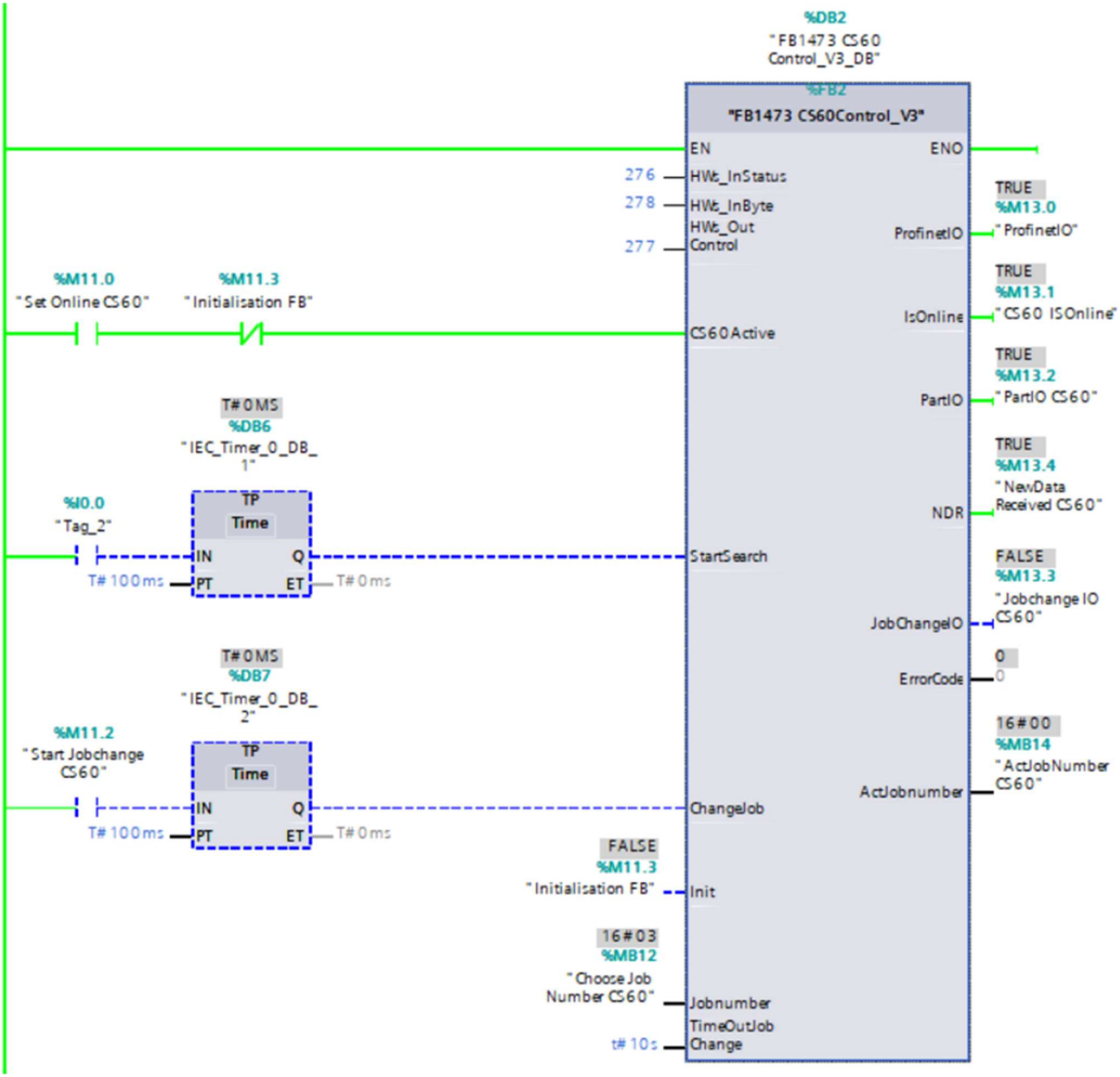
3. Generate blocks from source.



4. Check whether the module including the data types has been created.



Explanations of the Function Block CS60/ID600



BLOCK // Inputs

HWs_InStatus = CS60/ID600 status informations

CS-60/ID600 status information is sent from the CS-60/ID600 to the PLC.

Byte Offset	Bits	Data	Description
0	0	Online	**True = 1** if CS60/ID600 is online. **False = 0** if CS60/ID600 is offline.
	1	AckSetOnline	**True = 1** Acknowledge switchover of the SetOnline control bit.
	2		
	3	AckJobLoad	**True = 1** Acknowledge switchover of the JobLoad control bit.
	4	JobLoadOk	**True = 1** the job has been loaded. **False = 0** the job loading failed.
	5	Ready	**True = 1** if the CS60/ID600 can accept a trigger signal. **False = 0** if CS60/ID600 is busy.
	6	AckTrigger	Acknowledge triggers. **True = 1** after the rising edge, **False = 0** after the falling edge of the trigger.
	7		
1	0-7	JobId	The ID of the current job (1 .. 255).

HWs_InByte

Outputs assigned in the nVision-i.
nVision-i.en.pdf // 2.4.2 producing PROFINET outputs

HWs_OutControl = CS60/ID600 control commands

CS60/ID600 Control bits are sent from the PLC to the CS60/ID600.

Byte Offset	Bits	Data	Description
0	0	SetOnline	**True = 1** set the CS60/ID600 online. **False = 0** set the CS60/ID600 offline.
	1	JobLoad	**True = 1** Command to upload the desired job ID to the CS60/ID600 memory.
	2	BootJob	**True = 1** to set the selected job ID as boot job.
	3	Trigger	**True = 1** To trigger an image capture by the CS60/ID600.
	4		
	5		
	6		
	7		
1	0-7	JobLoadId	The ID of the job to load (1 .. 255).

CS60Active	
CS60Active = True	the CS60/ID600 is controlled online.
CS60Active = False	the CS60/ID600 is controlled offline.

StartSearch = Trigger	
StartSearch = True	the camera is triggert. (Please execute as impulse)
StartSearch = False	unassigned // no function.

ChangeJob = Start job change	
ChangeJob = True	the preselected job ID is loaded into the CS60 working memory. (Please execute as impulse)
ChangeJob = False	unassigned // no function.

Init = Initialisierung der Grundstellung	
Init = True	Initialization of the home position. All block functions will be set to false.
Init = False	unassigned // no function.

Jobnumber	
	Here the desired job ID is preselected before a job change.

Time Out Jobchange	
	A timeout for the job change can be set to receive an error at the **Error Code** output.

BLOCK // Outputs

ProfinetIO = Connection status Profinet // PLC – CS60	
ProfinetIO = True	Profinet connection between PLC and CS60 is available.
ProfinetIO = False	Profinet connection between PLC and CS60 is not available.

IsOnline	
IsOnline = True	the CS-60 is online
IsOnline = False	the CS-60 is offline

PartIO = Test part is good / overall OK	
PartIO = True	the set check of the job is passed. A notice: The PartIO signal must be assigned application-specifically from the n-Vision-i and in the PLC.
PartIO = False	unassigned // no function. A notice: The PartIO output signal has the following functions when using the NDR: Is PartIO = False and NDR = True the current test is not passed.

NDR = NewDataRecieved // New check cycle of the jobs ended	
NDR = True	If new data is read in via the interface or is available, NDR becomes true. It´s coupled with the ready signal of the CS60/ID600.
NDR = False	unassigned // no function.

JobChengeIO	
JobChengeIO = True	The desired job was correctly loaded into the CS60 working memory.
JobChengeIO = False	Loading the job failed.

ActJobnumber	
	Shows the current job ID that is in the CS60 memory. A notice: If jobs are loaded externally via nVision-i or the web browser, the value is corrupted. The value is updated again with each new trigger.

Error Code	
	In case of a timeout due to a failed job change, the error code "2" is output. If an empty job slot is loaded, the error code “2” is also displayed. (The error is reset with the Init input).

ENO and EN	
	Is a release output that can be activated or deactivated. Siemens PLC function. Link: https://support.industry.siemens.com/cs/document/67797146/wie-kann-bei-einer-anweisung-der-freigabeausgang-eno-aktiviert-werden-?dti=0&lc=de-WW

Hints for the integration of the module, its use and Profinet processes

1. For a successful Profinet process, a boot job must be defined once in the nVision-i software to ensure that a job is loaded when the CS60 is restarted. If this prerequisite is missing, the CS60 cannot be addressed via Profinet after a restart.

2. First the CS60 must be switched online via the input **CS60Active**. This must remain permanently set to **True** as long as you want to work with the CS60.

3. As soon as the module signals the online status with the output **IsOnline = true**, the CS60/ID600 can be triggered via the **StartSearch** input.

4. After each trigger cycle, the **JobID** is updated at the function block output as well as after a successful job change.

5. The job change is executed by the process via the preselected job number (1Byte) and the input **Changejob**. The function block automatically switches the CS60 offline to execute the job change, the input **CS60Active** must remain set to True. During the job change, the **IsOnline** output is set to false. Only after **IsOnline** is true again can it be triggered again.

6. After the successful job change the CS60 can be triggered via **StartSearch**.

7. The trigger signal must be executed as a pulse at the **StartSearch** input.

8 The function block does not support Free Run mode. If a Free Run is required, the trigger type Free Run can be selected in the CS60/ID600 job.

Trouble Shooting Profinet

1. **The CS60/ID600 is not visible in nVision-i after the Profinet protocol has been activated.**

   Possible cause: The device has not yet been assigned an IP address and device name in the network via the PLC (Profinet master), so the CS60/ID600 is on an undefined IP address 0.0.0.0 and cannot be displayed in nVision-i. Please assign an IP address and a device name via the PLC. Afterwards the device should be visible in nVision-i again.

2. **The CS60/ID600 was operated at a Profinet PLC, the connection was disconnected from the PLC and the device is no longer visible in nVision-i after a device restart**.

   Possible cause: The CS60/ID600 is waiting for the PLC communication and has no valid IP address in the network without the PLC master.

   There are three possible solutions.

   2.1. The network connection with the PLC is re-established and the CS60/ID600 receives a valid IP address again via the PLC. This is our recommended solution.

   2.2. Alternatively Profinet tools like "Profinet Commander" can be used to scan for Profinet devices in the network and assign a manual address.

   2.3. The operator performs a reset via the reset button. The reset sets the CS60/ID600 to its factory defaults, Profinet is disabled and the default IP address 192.168.3.15 /255.255.255.0 is loaded. The device becomes accessible again via nVision-i. The reset is only recommended if Profinet was activated by mistake.

3. **The device name does not change in nVision-i although a Profinet name was assigned via Profinet.**

   Cause: The Profinet name and the device name are independent according to the latest standards and can/may differ from each other. There is no need for action or there is no error.

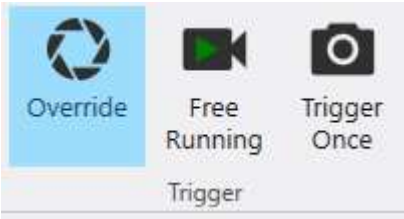
4. **IP address and subnet mask cannot be changed.**

   Possible cause: The PC has a second network card, please deactivate it in Windows/Network adapter. Only use the Network card which is connected to your device.

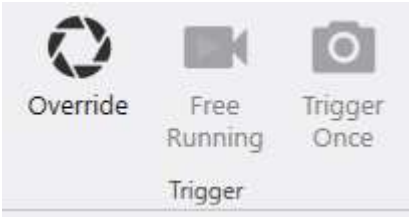
5. Job change or trigger via Profinet not possible.

Possible cause: You have taken control of the camera via nVision-i and used the Override in the software. Please deactivate the override.

Active (nVision-i has control)



Inactive (PLC has control)



5.1 If only the trigger via Profinet is not possible, please check your Trigger Type adjustment in nVision-i. It must be on “Virtual”.

6. After restarting the camera (power cycle), the device can no longer be addressed.

Possible cause: Please check whether a boot job has been defined. Without it, no job is loaded after a reboot and therefore the camera cannot be triggered or does not send a Ready.

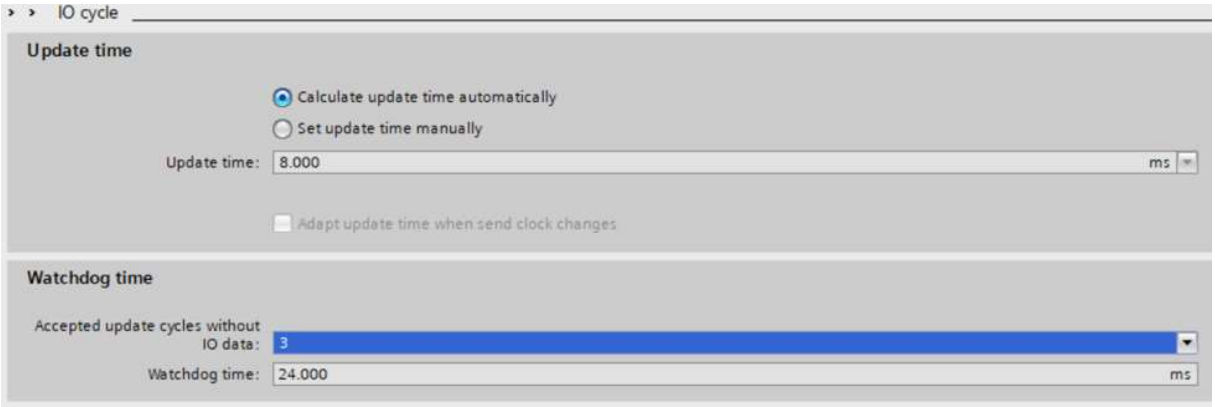
7. Profinet connection is interrupted or the cycle time of the camera is not stable, which you have already checked via a trace of your signal.

7.1 You are using the function block of the CS60/ID600 and it happens that the camera can no longer be addressed.

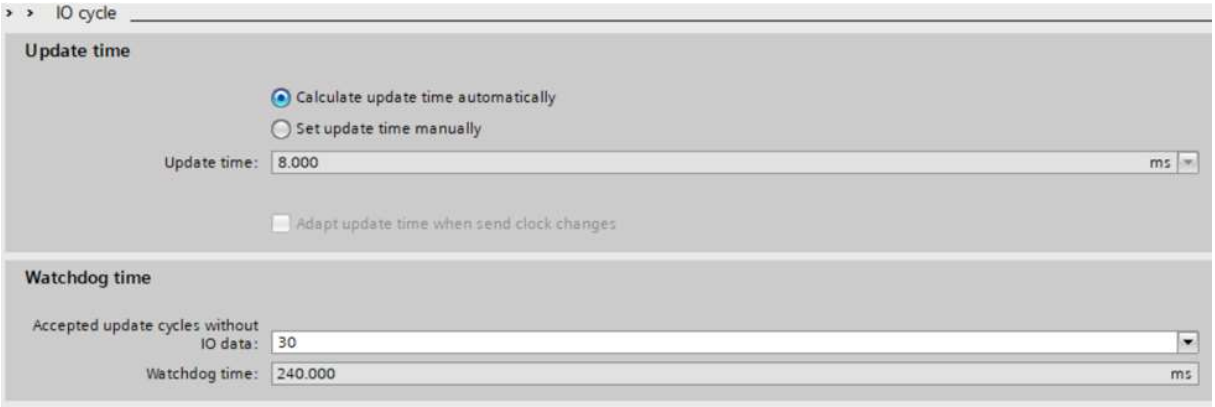
Possible cause: The camera has Profinet communication delays due to an overload, the Profinet packets are no longer provided to the PLC every 8ms and a timeout occurs in the default setting.

The response monitoring of the PLC switches off the connection and performs a restart of the interface. This restart takes approx. 1.5s, which is then reflected or added to the cycle time of the camera. To prevent the timeout, it is necessary to set the response monitoring time of the camera high.

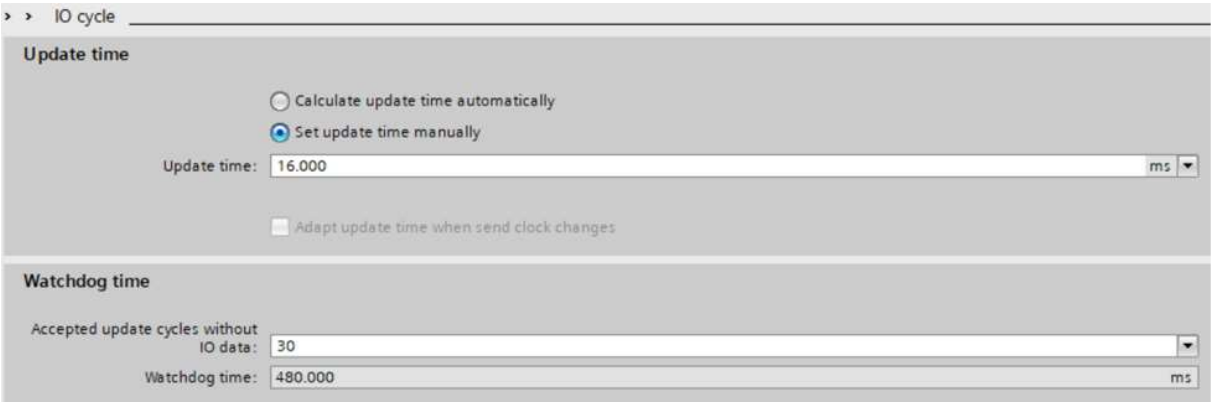
Standard update and watchdog time



Example of the higher watchdog time



Alternatively, the update time itself can be increased, but this delays the basic cycle time between the PLC and the camera. In this setup, however, significantly larger watchdog times are possible.



8. The camera is too slow for the application or the cycle time is very close to the limit and the required machine cycle time is not reached stably.

Possible cause: The larger a job becomes or the more tools are inserted, the longer the cycle times of the system become. This is completely normal and typical for the industry. A camera sensor is an embedded system and all calculations take place on the integrated board which has limited resources.

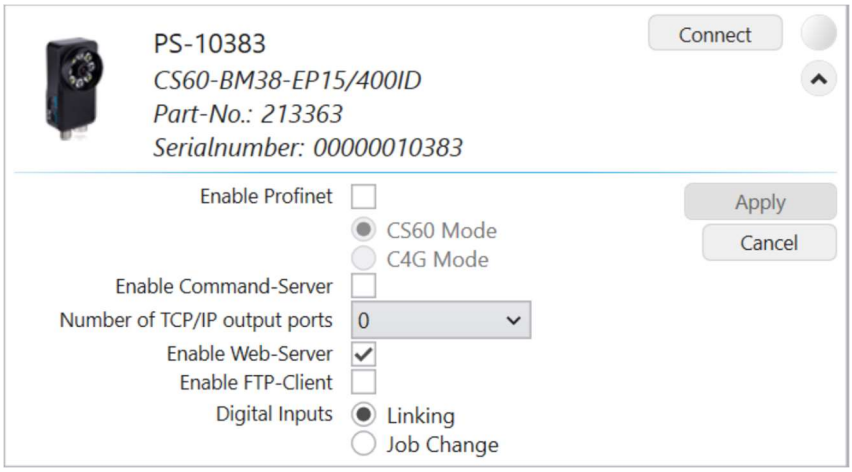
There are several solutions to optimize the cycle time.

8.1 If the image quality is optimal, tools run faster because the algorithms behind them have an easier time recognizing features. Optimizing the image quality with external lighting is one of the most efficient ways to achieve optimal performance with the overall system.

8.2 The use of different tools and related algorithms is one of the main factors of cycle time. A simple tool from the category "Detect" like "Brightness" or "Area Pixel" is much faster and more performant than the use of localization tools like "Shape" or "Edge".

8.3 Even if the optimal tool selection has already been made, sometimes small settings in the tool parameters can influence a lot.

8.4 Please check the basic settings of the camera and which functions or protocols have been activated. Every function that is active and unused causes an unnecessary workload in the background. Please deactivate everything that is not used.



If and how your job can be optimized by other tools, tool combinations or parameter settings or illuminations, the technical customer service of di-soric can support you.

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