Application Note



SBRD Vision System integration with S7-1500 PLC USING TIA PORTAL 15

This Application Note helps the user to integrate SBRD Vision System with Siemens S7-1500 PLC using TIA Portal 15. Also this application note briefly describes the Function Blocks which are used for controlling the functionality of SBRD Vision System. Type(s)

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Table of contents

1	Components/Software used	4
2	APPLICATION DESCRIPTION	5
2.1	Topology	5
3	Configuration of SBRD Vision System with Camera Configuration Studio for PROFINET	6
3.1	IP configuration of the SBRD Vision System.	6
3.2	Create a project with CCS software	7
3.3	Job navigator 1. Step Set up	8
3.4	Step 2 Configure cameras	8
3.5	Step 3 Acquire records	8
3.6	Step 4 Prepare inspection	9
3.7	Step 6 Configure I/O	10
3.8	Step 7 Perform test run	11
3.9	Step 8 Finish job	11
4	S7-1500 PLC CONFIGURATION IN TIA PORTAL	. 12
4.1	Creating a new project in TIA Portal	12
4.2	Detecting the actual hardware configuration of the PLC connected in the network	16
4.3	Configuration of the IP parameters of the profinet interface of the PLC.	18
5	Adding GSDML File of SBRD Vision System to TIA Portal	. 19
5.1	GSDML file	19
5.2	Adding the GSD File to TIA Portal	19
6	Configuration of SBRD Vision System in TIA Portal.	21
6.1	Adding the installed SBRD Vision System to Network View	21
6.2	Network Configuration of Profinet Interface SBRD Vision System in TIA Portal.	23
6.3	Assigning Profinet name to SBRD Vision System.	25
6.4	Adding Data Module to SBRD	27
6.5	Identifying Hardware ID of the Sub modules of SBSI Vision Sensor.	29
7	Linking VisionSensor library to the project	31
8	DESCRIPTION OF SBSI VISION-Siemens Library FUNCTION BLOCKS	.34
8.1	FB_CheckSBSI	34
9	INTEGRATION OF FUNCTION BLOCKS INTO PROJECT	37
9.1	FB_CheckSBSI	37
10	FUNCTION BLOCK EXECUTION WITH AN EXAMPLE	. 39
10.1	Prepare the SBRD Vision System to monitor the results in CCS-software	. 39
10.2	Example description in TIA Portal	. 41
10.3	Payload Data Mapping between TIA Portal and Camera Configuration Studio.	. 46

1 Components/Software used

Type/Name	Version Software/Firmware
SBRD controller pn 8067301	Fw version 1.1.04
GSDML File for SBRD Vision System	GSDML-V2.33-Festo-SBRD-Q-20181126
Siemens TIA Portal	V 15.1
Camera Configuration Studio	V 1.1.19323
Festo Field Device Tool	V 2.9.9 or higher

Table 1.1:Components/Software used

2 APPLICATION DESCRIPTION

This document explain the integration of the host function blocks of SBRD Vision System into SIEMENS TIA Portal V15.

The supported systems are:

- S71500
- S71200

Supported Field Bus :

• Profinet IO

The application note has the description for the following:

- SBRD Vision System configuration in Camera Configuration Studio. CCS
- Configuring the needed payload data of the camera in Camera Configuration Studio.
- SBRD Vision System Setup in SIEMENS TIA Portal.
- Installing the GSDML File for SBRD Vision System.
- Adding the SBRD Vision System to Devices and Networks in TIA Portal.
- Description of the function blocks of SBRD Vision System.
- Integrating the Function Blocks within the programming environment of TIA Portal.

2.1 Topology

The following topology is used to communicate between S7-1500/1200 PLC and SBRD Vision System:



NOTE

- Only the RJ45 socket on the right side is designated for the Profinet network.
- The IP address of SBRD Vision System, Ethernet Port of S7-1500/1200 and the PC used for programming the PLC, must be in the same IP range.

3 Configuration of SBRD Vision System with Camera Configuration Studio for PROFINET.

Remark:

The following explanation show only a basic vision project to enable the communication by Profinet. It is not intended to show the capabilities of the CCS software.

3.1 IP configuration of the SBRD Vision System.

- Open Festo Field Device Tool.
- The following screen will be displayed in Festo Field Device Tool when SBRD controller is connected.

Actions Extras Help			Festo Field Device Tool			
Scan Firmware Recovery Favorite	Firmware Firmware with Backup Netw	vork Diagnosis Backup Restor	e Identification Versions Bootappl	cation Reboot	Telnet Homepage	
General		Service			Web	Tools
List view Graphic view				→ ×	Device properties	
Device name	IP Address Device type 192.168.2.2 SBRD-Q	MAC 00:0E:F0:5A:E2:B9	Firmware 1.1.0.4-eceb02b66.20191127		Devicemanie: SBRD-0. Devicetipe: SBRD-0. Devicetipe: SBRD-0. Devicetipe: SBRD-0. Patriumber: TLA249100 Patriumber: unknown Filmware: 11.0.4-eceb02b65.2 DHCP: no IP Address: 192.168.2 IP Netmask: 255.255.0 Gateway: 0.0.0 MAC: 00.00:F0.00 MAC: Operational State: Operational <th>0FFFF43001450BE0AD3 0191127 0 0 IA:E2:B9</th>	0FFFF43001450BE0AD3 0191127 0 0 IA:E2:B9

• Select the controller and press Network button in the ribbon.

6	
Device name: SBRD-Q	-
Current Network Settings:	
IP-Address:	192.168.2.2
Subnetmask:	255.255.0.0
Standardgateway:	0.0.0.0
DNS-Server:	0.0.0.0
 Retrieve IP-Address a Use the following IP-A 	utomatically: Iddress:
 Retrieve IP-Address a Use the following IP-A IP-Address: 	utomatically: Iddress:
 Retrieve IP-Address a Use the following IP-A IP-Address: Subnetmask: 	utomatically: address: 192.168.2.2 255.255.0.0
 Retrieve IP-Address a Use the following IP-A IP-Address: Subnetmask: Standardgateway: 	utomatically: ddress: 192.168.2.2 255.255.0.0 0.0.0.0
 Retrieve IP-Address a Use the following IP-A IP-Address: Subnetmask: Standardgateway: DNS-Server: 	utomatically: ddress: 192.168.2.2 255.255.0.0 0.0.0.0 0.0.0.0

• Now you can edit IP-address, subnet mask and the name of the device.

Important Conditions for properly working PROFINET communication

- **1.** The Device name must be identical in PLC and SBRD controller.
- 2. The IP address of SBRD and PLC must correspond (must be in same address range).
- **3.** IP address and name can be set in different ways:
 - Via FFT software (Festo Field Device Tool)

Application Note-SBRD Vision System Integration of Host Function Blocks in SIEMENS TIA Portal V15

• **Via PLC interface** (TIA portal). Refer **Chapter 6** to get detailed description on how to set SBRD-IP address and device name from TIA portal.

3.2 Create a project with CCS software

• Open CCS and select New Job



• Click on the shown IP-address to open the search process for the connected device.



- Select the device and connect
- If device is connected click on Configure to enter the configuration mode of the system



3.3 Job navigator 1. Step Set up

- Follow the steps in Job navigator. 1. Set up: select the camera
- The auto detect function show all the connected cameras. Select the one which is used for the task.

3.4 Step 2 Configure cameras

• Adjust the exposure time and do a calibration of the coordinate system, if it is necessary, to get the results in mm-values. Details explained in the CCS online help (File > Help) chapter 5.



3.5 Step 3 Acquire records

- Place a test part in front of the camera and capture an image with the trigger button. At least 1 image is required.
- Drag and drop one image to the sample part column (green container icon) in the record list.

Acquire record File View Acquire record	*14 M.	ay 2020.ccsproj - Festo Camera Configuration Studio 1.1.19323
Device trigger 2500 ms Trigger Periodical trigger	Temporary Sample Inspection Max. records I When maximu	number 200 Correction
Trigger	Intended use of new records	Data storage
Connected device <	Record overview - Temporary records	
SBRD-Q, F/W v1.1 ② (□ ▼ ◊ ▼ 1) ○ 192.168.2.2 Connected Disconnect Device mode: To Run mode Configuration mode To Run mode Job: «Configuration» Ξ 1 Job navigator <	Drag and drop Record lists × Record view ×	
2. Configure carrieras	Ignore Nº ori Type Comments	Nº Ori Type Comments

3.6 Step 4 Prepare inspection

- This application note focus on 2 use case. The first use case is to transfer x,y-coordinates. The second use case is to transfer a string variable of a bar code to the PLC.
- Use case 1: apply a tool e.g. xSBLOB to the part in the image. This is possible by double click on the tool or by drag and drop out of the Tool library into the image or the Tool structure.
- Move and adapt the search region of the xSBLOB, that it covers the field of view.
- By default, the xBLOB calculate x,y-coordinate and an angle. This results will be transferred by Profinet to PLC in this example. The settings in the tool could be more specified, but for this basic example it is not necessary. In tool results you can see the calculated coordinates.



- Use case 2: Select a tool for the code reading. xBarcode or xDatacode as in the image is available.
- Move and adapt the search region of the tool, that it covers the field of view.
- By default, the code reader tool calculate the content, x,y-coordinate and an angle of the code. This results will be transferred by Profinet to PLC in this example. In tool results you can see the code and the coordinates.



• The next **step 5** is not necessary due to basic vision example.

Step 6 Configure I/O 3.7

Doubleclick or drag and drop the Profinet telegram out of the I/O Telegram into the field of Protocol-• based I/O.

I/O settings × I/O results ×		I/O structure ×
Digital inputs		Digital I/O: Type Assigned value Digital inputs
Description Digital inputs Assignment		Digital outputs
Available functions	Assigned functions Digital (12)	
モニ Acknowledge error, apply inputs signal 着正 Apply inputs signal ぞ臣 Job number	X2.2 Di Not assigned X2.3 B Not assigned X2.4 attrigger signal X2.5 attrigger signal X2.6 attrigger signal X2.7 attrigger signal	Protocol-based I/O: Drop protocol-based I/O here Add protocol-based outputs to the job by dragging it from the I library
I/O library		rag and drop ×
ビン //O	Profinet PNa to the Profine U PNa to the Profine U Notice Voltage data and functions Plage to the Result Ragwords VO Notice Voltage data and functions Notice Voltage data and functions Notage d	einet - Part Detector signs data and functions the Telnet - Result output ECS VO Telnet - Result output to Telnet - Result output

- Then it is possible to assign data to the protocol. Select the particular coordinate and drop it on the suitable data type.
- Once the data is assigned, it is possible to choose different value. For the coordinates it is possible to use the Value(trans), which mean the mm-calibrated value of this coordinate. On value it is the result in pixel.
- For the code data it is important to assign to the string 64 x 8 bit data type. And the value (text) as an ٠ ASCII format.

Profinet			
General			
Description Profinet			
Assignment			
Available functions and data		Assigned data	
lool results 1,3		float: 32 bit	(2) ^
 ▲ SSBLOB: xSBLOB ▲ 1. Area ▲ 2. X center of gravity 		8xSBLOB:xSBLOB 2. X center of gravity	Value 👻
3. Y center of gravity 4. Angle of inertia axis	Drag and drop	<pre>&%xSBLOB:xSBLOB 3. Y center of gravity</pre>	Value (trans.) 🔻
▲ Sig xDATACODE: xDATACODE ★ 5. Code data		int: 32 bit	(0) 🗸
🖾 o. X center		string: 64 x 8 bit	(1) ^
📩 8. Angle		*** xDATACODE: xDATACODE 5 . Code data	Value (text) 👻
Advanced settings			

3.8 Step 7 Perform test run

- This is the step where the application and the communication to the PLC could be tested.
- Keep this step for the commissioning of the TIA controller.
- Now the SBRD-controller calculate the results and communicate. (In the other steps the results were calculated by the performance of the PC.)
- The processing time is displayed for evaluation of the application.
- Every trigger by input or Profinet protocol will capture an image and calculate new results.

3.9 Step 8 Finish job

- If the commissioning of the image set-up and the communication by Profinet is successful established, the settings have to be transferred to the persistent job memory on the SBRD-controller.
- Right mouse button on the job icon allow to edit a name for the job
- Drag and drop the job on one of the possible memory.
- Click on job icon in device column to set this memory as the active job. (play button)
- Finish the step and configuration of the controller: Switch to Run mode and disconnect the device.

Connected device	٢	Job manager	_	
SBRD-Q, F/W v1.1	•	Festo Camera Configuration Studio	1	Device
Connected Disconnec	t	Blob-Inspection Part 1	52.8 kB	I. Blob-Inspection Part 1 No iob description provided
Configuration mode To Run mode	de 1		Drag and drop	2. Job empty job
Job navigator	<			3. Job empty job
1. Set up	•			4. Job
3. Acquire records	•			5. Job empty job
4. Prepare inspection	•			6. Job empty job
5. Inspect objects	~			7. Job empty job
7. Perform test run	* *			8. Job empty job
8. Finish job • Adjust job name and description	^	Project documentation		·
Transfer job to the device Add project documentation, save proje file	ct	Project Customer Device Transport system Project number:		
Edit current ich name		Project name:		

Application Note-SBRD Vision System Integration of Host Function Blocks in SIEMENS TIA Portal V15

4 S7-1500 PLC CONFIGURATION IN TIA PORTAL

4.1 Creating a new project in TIA Portal

- 1. Start the TIA Portal V15.1 software.
- 2. Double click on Create New Project to create a new project.



3. Enter the Project name and select the path where the project must be saved in your system. Then click on **Create** to create the project.

Create new project	
	Enter project name
Project name:	SBRD_Profinet
Path:	C:Users/FestolDocuments/Automation
Version:	V15.1 *
Author:	Festo
Comment:	
	Create

Application Note-SBRD Vision System Integration of Host Function Blocks in SIEMENS TIA Portal V15

4. Double Click on **Configure a device** to configure the PLC needed.



5. Double Click on **Add New Device** to add a new PLC to the project.



6. Click on the PLC needed . In the below example S7-1500 is selected. All the available CPU's under S7-1500 will be displayed.



7. Click on Unspecified CPU S7-1500 and select the PLC below it and click on Add Device.

NOTE

•

If we select Unspecified CPU S7-1500, then the actual hardware configurations of the PLC can be read by using the detect hardware configurations option.

This saves the time needed to do the hardware configurations from the hardware catalog.



8. The project view will be as shown below.



The device is not specified. → Please use the <u>Hardware catalog</u> to specify the CPU, → or <u>detect</u> the configuration of the connected device.

4.2 Detecting the actual hardware configuration of the PLC connected in the network

1. Click on **Detect the configuration of the connected PLC** option to retrieve the PLC Configuration.



2. Once the hardware detection option is selected the following will be displayed.

Ŧ		Type of the PG/PC in PG/PC in	terface: <mark>L PN/IE</mark> terface: Intel(R) Ethernet Connect	▼ tion (4) I219-LM ▼ ♥
	Compatible acc	essible nodes of the selec	ted interface:	Address	MAC address
	Device	bevice type	intendee type	Autoress	MAC BUUICSS
				Click t	o search the available PLC's
Flash LED					
nline status informat	ion:			🗌 Display	Start search

3. Click **Start Search** to find the PLC's which are available in the network as shown in the above image.

4. Once the search is completed the PLC in the network will be showed as shown below: Click **Detect** to retrieve the hardware configurations of the PLC connected in the network.

Hardware detection for	т РLС_1 Туг	be of the PG/PC interf PG/PC interf	iace: PN/IE iace: i Intel(R)	Ethernet Connection (▼ 4) 1219-LM ▼ ()
	Compatible accessible n	odes of the selected	Interface:			
	Device	Device type	Interface type	Address	MAC address	
	plc_1.profinet interface	CPU 1516F-3 PN/	PN/IE	192.168.4.1	AC-64-17-3D-EE-7B	
	PLC connected	to the networ	k			
Flash LED						
				_	<u>S</u> tart se	arch
Online status information	:			📃 Display only	error messages	
🕤 Scan completed. 1 co	ompatible devices of 1 acc	essible devices four	nd.			^
Scan and information	n retrieval completed. prmation	Click to dete	ct the actual I	nardware config	of the PLC	=
					Detect <u>C</u> anc	∨ :el

- 5. Select the PLC which is communicating with the SBRD controller from the PLC's found in the search.
- 6. Click **Detect** to retrieve the hardware configuration of the PLC.
- 7. Once the hardware configuration is retrieved from PLC, go to Device configuration .



4.3 Configuration of the IP parameters of the profinet interface of the PLC.

→

NOTE

- The Profinet Interface address of PLC, SBRD-Vision System and the PC used for programming the PLC must be in the same range.
- 1. Double click on **the Profinet interface_1**(refer above image) to view the properties of the Profinet interface.



2. Go to **General > Ethernet address** to change the IP parameters of Profinet interface_1.

	Ethernet addresses	
	Interface networked with	
	Subnet:	Not networked
		Add new subnet
	IP protocol	
		Set IP address in the project
		IP address: 192.168.4.1 Enter IP and Subnet
4		Subnet mask: 255 . 255 . 0 mask
		Use router
-		Router address: 0 . 0 . 0 . 0
		O IP address is set directly at the device
	PROFINET	
		PROFINET device name is set directly at the device
		Generate PROFINET device name automatically
	PROFINET device name:	plc_1.profinet interface_1
	Converted name:	plcxb1.profinetxainterfacexb1036c
	Device number:	0

5 Adding GSDML File of SBRD Vision System to TIA Portal.

5.1 GSDML file

The Profinet GSDML file can be found in the location where the CCS- Software is installed. C:\Program Files\Festo\CCS 1.1\Profinet



5.2 Adding the GSD File to TIA Portal

The GSDML file of SBS Vision Sensor must be added to the TIA portal.

1. Click on Options >> Manage General Station Description Files (GSD)



- 2. Browse to the folder where the file is located.
- 3. Once the GSDML file has been selected, click on **install** to start installing the GSDML file.

Application Note-SBRD Vision System Integration of Host Function Blocks in SIEMENS TIA Portal V15

Manage general sta	tion description	files			×
Installed GSDs	GSDs in the p	oroject		Browse	
Source path: C:\l	Jsers\Festo\Docum	ents\Automati	on\TST-Profinet_	_SBRD\AdditionalFiles\GSD	
Content of importe	ed path				
File		Version	Language	Status	Info
GSDML-V2.33-Fest	to-SBRD-Q-2018	V2.33	English, Ger	Not yet installed	Machine Vi
<	select GSDN and ins	the ML stall		Delete Install	Cancel

4. Once the GSDM file is installed the following pop up will be displayed.

Installation result									
Message									
Installation was complete	d successfully.								

5. Click on **CLOSE** button to finish the installation and update the hardware catalogue.

6 Configuration of SBRD Vision System in TIA Portal.

6.1 Adding the installed SBRD Vision System to Network View.

1. Double on Devices and Networks .



2. The network view will be displayed as shown below.

s71500 > Devices & networks			_ !
	🚽 Topology view	🛔 Network view	Device v
💦 Network 🔢 Connections HMI connection 💌 💀 Relations 🕎 🖶 🔛 🛄 🔍 ±			E
PLC_1			
CPU 1516F-3 PN			

3. Go to Hardware Catalog as shown below.



4. Under Hardware Catalog, Go to Other Field Devices >>>Profinet IO >>> Sensors >>> Festo AG&Co. KG >>> SBRD.



5. Drag and drop the SBRD to the network view as shown below.



- 6. Connect the S7-1500 PLC to SBRD controller.
- 7. Double click on **Not Assigned** as shown below.



8. Select the Profinet interface. If there are more then select the correct one, where the controller is physically conneted.

After the profinet interface is selected the connection in the device view will look as shown below:



6.2 Network Configuration of Profinet Interface SBRD Vision System in TIA Portal.

1. Go to Devices and Networks and Double click SBRD.

PLC_1 CPU 1215FC	SBRD-PN SBRD PLC_1	DP-NORM
	PN/IE_1	double click on <u>SBRD</u>

2. Once you double click the following display will be seen.

			📑 Торо	logy vie	w 💑 N	etwork vi	ew 🛛 🛛 🖓 Device	e view
🔐 [SBRD-PN [SBRD]	3	Device overview						
2	^	Y Module	Rack	Slot	I address	Q address	Туре	Articl
		 SBRD-PN 	0	0			SBRD	8067
61 ²		PN-IO Interface	0	0 X1			SBRD-PN	
and			0	1				
9			0	2				
			0	З				
			0	4				
			0	5				
			0	6				
			0	7				
	-		0	8				
			0	9				
	_							

3. Click on **SBRD** to view the properties .



4. The Network parameters can be viewed under **Ethernet Addresses** tab as shown below.

SBRD-PN [SBRD] 😽		🔍 Properties	🗓 Info 🚺 🗓 Diagnostics	
General IO tags Sys	stem constants Texts			
✓ General Catalog information	Ethernet addresses			
▼ PROFINET interface [X1]	Interface networked with			
General Ethernet addresses ✓ Advanced options Interface options	Subnet: PN/E_1 Add new subnet			•
 Real time settings 	IP protocol			
IO cycle				
Port 1 [X1 P1]	Profinetwork Set IP address in the project			
Identification & Maintenance	parameters of the IP address: 192 168 0 1			
Shared Device	SBRD controller Subnet mask: 255 . 255 . 255 . 0	-		
	Synchronize router settings with IO controlle	er		
	Use router			
	Router address: 0 . 0 . 0 . 0			
	O IP address is set directly at the device			
	PROFINET			



NOTE

• The IP address of the Profinet interface **SBRD**, **S7-1500 PLC and** IP address of your PC must be in the same range.

Application Note-SBRD Vision System Integration of Host Function Blocks in SIEMENS TIA Portal V15

6.3 Assigning Profinet name to SBRD Vision System.

1. Go to Devices and Networks . Double click SBRD to go to device view.

VisionSensorFB ► Devices & networks	
Network Connections HMI connection	🕎 📲 🛄 🔍 ±
PLC_1 CPU 1516F-3 PN	SBSI PLC_1

2. Right click on **MSE** » Click **Assign Device Name** as shown below.

Right Click	Change device	
	Write IO-Device name to Micro Mem	nory Card
	Start device tool	
3	Cut	Ctrl+X
III.	Сору	Ctrl+C
	Paste	Ctrl+V
>	C Delete	Del
6	Go to topology view Go to network view	
	Compile	E.
	Download to device	•
ags	🖡 Go online	Ctrl+K
- go	Go offline	Ctrl+M
on	Online & diagnostics	Ctrl+D
	Assign device name	ick to assign Profinet
es	opoate and display lorced operand	
5	Cross-references	F11
ins 🖹	Cross-reference information	Shift+F11
ngs	Show catalog	Ctrl+Shift+C
	Export module labeling strips	
2	Properties	Alt+Enter

3. The wizard for assigning Profinet Device name looks as shown below. Search the available devices in the Profinet network by clicking **Update List.**

Assign PROFINET device	name.						×
		Configured PRO	FINET dev	vice			
		PROFINET devic	e name:	sbrd-pn			
		Dev	vice type:	SBRD			
		Online access					
		Type of the PG/PC i	nterface:	PN/IE		▼.	
		PG/PC i	nterface:	VirtualBox Host-Only Et	hernet Adapter	- 🖲 💽	
		Device filter					
1		🛃 Only show	devices of t	he same type			
		Only show	devices wit	h bad parameter settings			
		Only show	devices wit	hout names			
	Accessible devi	ices in the network:					
	IP address	MAC address	Device	PROFINET device name	Status		
							-
Flash LED							-
	<					3	>
				Up	date list	Assign name	
			_				
			cli	ck Update list			
Online status information:							
<			1111				>
						Close	
						L	

4. Once the search is completed the available profinet devices in the network will be displayed.

accessible devic	es in the network:						
IP address	MAC address	Device	PROFINET device name		Status		
192.168.0.1	B6-F2-F5-E0-06-2C	SBRD-Q	sbrd-pn	0	ок		
-							
						1	
<							>
				Upda	ate list	Assign name	

5. Click **Assign Name** to assign the profinet device name to the project.

Assign PROFINET device na	ime.							
		Configured PRO PROFINET devic Dev	FINET des te name: vice type:	sbrd-pn				
		Online access Type of the PG/PC i PG/PC i	nterface: nterface:	PN/IE	T Des	iktop Adapter	• • •	q
	ecocikia davi	Device filter Only show Only show Only show	devices of 1 devices wit devices wit	the same type h bad parameter setting hout names	s			
	P address	MAC address	Device	PROFINET device nam	e	Status		
E .	192.168.0.1	B6-F2-F5-E0-06-2C	SBRD-Q	sbrd-pn		OK		
Flash LED	<			IIII	Upda	ate list	Assign na	me

6.4 Adding Data Module to SBRD.

1. Go to Devices and Networks . Double click SBRD to go to device view.

• Devi	ce view	appears as shown b	elow.						
SBRD-PN [SBRD]		🛛 🖽 🕎 🖌 🔛 🛄 🔍 ±		Device overview					
			<u>^</u>	Y Module	Rack	Slot	I address	Q address	Туре
				 SBRD-PN 	0	0			SBRD
	642			PN-IO Interface	0	0 X1			SBRD-PN
	RD				0	1			
	94				0	2			
					0	з			
			•		0	4			
					0	5			
		DP-NORM	•		0	6			
					0	7			
					0	8			
					0	9			

- By default there are no bytes addressed! The SBRD Profinet interface provide control, status and data modules. Now the particular modules have to be adjusted according to following order:
 - 1. Ctrl
 - 2. Stat
 - 3. Data

Drag and drop the modules:

Rack	Slot	I address	Q address	Туре	✓ Catalog
0	0			SBRD	<search></search>
0	0 X1			SBRD-PN	Filter Profile: <all></all>
0	1		24	CTRL (3 bytes)	Head module
0					▼ Module
0	3				 Control module (CTRL)
0	4				CTRL (3 bytes)
0	- ⁵ d	rag CTRI	L and dro	p on	Data module (DATA)
0	5	19	st slot		 Image: Status module (STAT)
0	· ·				
					W Catalog
Rad	k Slot	laddress	Q addres	s Type	
0	0			SBRD	<search></search>
0	0 X1		2.4	SBRD-PN	Filter Profile: <all></all>
0	2	2 7	24	CTRL (5 bytes)	🕨 🕨 🖿 Head module
	2	2/		SIAT (0 bytes)	→ The Module
0	4				✓ ☐ Control module (CTRL)
0	5				CTRL (3 bytes)
0	drag STA	T and dr			Data module (DATA)
0	uiay STP 2	nd slot			▼ III Status module (STAT)
0	0	10 5101			STAT (6 bytes)
	Rack 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Rack Slot 0 0 0 0 0 0 0 3 0 3 0 4 0 5 0 6 0 7 0 7 0 0 0 0 0 7 0 0 0 0 0 0 0 1 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 3 0 4 0 5 0 5 0 7 0 7	Rack Slot I address 0 0 0 0 0 × 1 1 0 0 × 1 1 0 1 1 0 3 1 0 3 1 0 4 1 0 5 drag CTRI 0 6 1 0 7 1 0 7 1 0 7 1 0 7 1 0 7 1 0 7 1 0 7 1 0 7 1 0 0 1 0 0 1 0 3 1 0 3 2 0 4 1 0 5 1 0 1 2 0 3 1 0 5 1 0 3 1 0 5	Rack Slot I address Q address 0 0 0 24 0 1 24 0 3 24 0 3 3 0 4 3 0 6 04 0 5 04 0 6 04 0 6 04 0 6 04 0 6 04 0 7 04 0 7 04 0 7 04 0 7 04 0 7 04 0 7 04 0 1 14 0 1 24 0 1 24 0 1 24 0 1 24 0 3 14 0 3 14 0 5 14 0 5 14	Rack Slot I address Q address Type 0 0 0 SBRD SBRD 0 0 X1 SBRD-PN SBRD-PN 0 1 24 CTRL (3 bytes) 0 3 - - 0 3 - - 0 4 - - 0 5 drag CTRL and drop on 1st slot - 0 6 - - - 0 6 - - - 0 6 - - - 0 7 - - - 0 7 - - - 0 7 - - - 0 7 - - - 0 7 - - - 1 1 - - - 0 0 2 - - - 0 1 2 - - -

- Based on the amount of data in Profinet dataoutput, which is configured in CCS, the appropriate size of data module has to be assigned.
- The available options are :



• Drag and drop the needed data module to the Device Overview as shown below. In our example we have considered DATA(2+ 256 bytes).

Device overview							
Module		Rack	Slot	I address	Q address	Туре	✓ Catalog
 SBRD-PN 		0	0			SBRD	<search></search>
PN-IO Interface		0	0 X1			SBRD-PN	Filter Profile: All>
CTRL (3 bytes)_1		0	1		24	CTRL (3 bytes)	Head module
STAT (6 bytes)_1		0	2	27		STAT (6 bytes)	
		0	3				Control module (CTRL)
		0	4				CTRL (3 bytes)
		0	5				T Data module (DATA)
		0	6				DATA $(2 \pm 128 \text{ bytes})$
		0	7				DATA (2 + 16 bytes)
DATA (2 + 256 bytes)_1		0	8	68325	-	DATA (2 + 256	DATA (2 + 256 bytes)
		0	9				DATA (2 + 32 bytes)
							DATA (2 + 512 bytes)
	drag the Data modu		ata module	DATA (2 + 64 bytes)			
				and drop it to Slot 8		it to Slot 8	DATA (2 + 8 bytes)
				_			 Status module (STAT)
							STAT (6 bytes)

6.5 Identifying Hardware ID of the Sub modules of SBSI Vision Sensor.

, ,	Device overview						
	🐈 Module		 Rack	Slot	I address	Q address	Туре
	 SBRD-PN 		0	0			SBRD
	PN-IO Int	terface	0	0 X1			SBRD-PN
	CTRL (3 byte	es)_1	0	1		24	CTRL (3 bytes)
	STAT (6 byte	es)_1 🕇	0	2	27		STAT (6 bytes)
			0	3			
			0	4			
_	sel	ect CTRL	0	5			
4			0	6			
			0	7			
•	DATA (2 + 2	56 bytes)_1	0	8	68325		DATA (2 + 256
			0	9			

• In **device view**, select **CTRL module** as shown below.

• Select **System Constants** as shown below from the Properties tab of **CTRL** module.

CTRL (3 bytes)_1 [CTRL (3 bytes)]				Rroperties	🔄 🛄 Info
General IO tags System constants	Texts				
Show hardware system constant 💌					
Name	Туре	Hardware identifier	Used by	Comment	
SBRD-PN~CTRL_(3_bytes)_1	Hw_SubModule	279	PLC_1		

• In **device view**, select **STAT module** as shown below.

STAT (6 bytes)_1 [ST	AT (6 bytes)]				Sector Properties	1
General IO tag	gs System constants	Texts				
Show hardware system	n constant 💌					
Name		Туре	Hardware identifier	Used by	Comment	
SBRD-PN~STAT_(6)	5_bytes)_1	Hw_SubModule	280	PLC_1		

• In **device view**, select **DATA module** as shown below.

DATA (2 + 256 bytes)_1 [DATA (2 + 256 bytes)]	🖳 Properties	L Inf			
General IO tags System constants	Texts				
Show hardware system constant 💌					
Name	Туре	Hardware identifier	Used by	y Comment	
SBRD-PN~DATA_(2_+_256_bytes)_1	Hw_SubModule	281	PLC_1		

7 Linking VisionSensor library to the project.

1. Unzip the library enclosed in the application note into a folder of your choice.

IMPORTANT:

The library was initially intended for the SBSI Vision Sensor from Festo. The functionally of the Profinet is fully identical. So in the following description the SBSI name is equal for the implementation for the SBRD Vision System!

2. Click on Options > Global Libraries > Open Library as shown below.

Options loois Window Help	
Y Settings	e 🖉 Go offline 🛛 🛔 🖪 🗶 🚍
Support packages	
Manage general station description files (GSD) Start Automation License Manager	
show reference text	
🛄 Global libraries	Create new library
	🕞 Open library
	Retrieve library

3. Choose the path where the Library SBSI Siemens is saved in your system. Select the library and click **OPEN.**

the second se					
🚻 Open global	library				×
Look in:	SBSI-Sieme	ns	~	G 🤌 📂 🖽 -	
<u>_</u>	Name	^		Date modified	Туре
	Additional	Files		16-08-2019 16:11	File folder
Quick access	IM			16-08-2019 16:11	File folder
	System			16-08-2019 16:16	File folder
	TMP			16-08-2019 16:11	File folder
Desktop	UserFiles			16-08-2019 16:11	File folder
-	XRef			16-08-2019 16:11	File folder
	SBSI-Siem	ens.al15_1		16-08-2019 16:16	Siemens T
Libraries	Select the library				
	<				>
1	-				
Network	File name:	SBSI-Siemens.al15_1		~	Open 👇
	Files of type:	Global library		~	Cancel
		Open as read-only			

4. The opened library is now available in "Libraries > Global Libraries".



5. Open the **SBSI-Siemens** Library to view the content.



- 6. The Library has the following sub folders:
- Function Blocks : It has the Function Block named **FB_CheckSBSI** which is used to control the SBRD basic functions.
- Drag and drop the folder Function Blocks to the folder Program Blocks in your project. Drag and drop the folder Function Blocks to the project as shown below.



8. Once the folders from the library has been copied to the project, the **Project Tree** will look as shown below.



8 DESCRIPTION OF SBSI VISION-Siemens Library FUNCTION BLOCKS

The library has 1 Function Blocks within it:

1. FB_CheckSBSI

8.1 FB_CheckSBSI

The Functions block has the following features:

- It allows the user to do Vision Sensor control operations. Using this Function Block the user can control the triggering of the SBRD.
- Using the Function Block the job number of the vision sensor can be changed.
- It gives the various status information of the SBRD operation like **Active job number**, **Error information** occurred during the operation, **Job change acknowledgement**, **Trigger acknowledgement**.
- It allows outputs the data output result data of the active job.
- Attention: The communication fail and the FB is blocked, when a job no. without Profinet setting is being selected!

The below image shows the schematic view of the FB_CheckSBSI block.



The following tables gives a detailed explanation of the inputs and outputs of the function block.

INPUT DATA

NAME	DATA TYPE	DESCRIPTION
iSBSICtrl_HWID	HW_ANY	Hardware ID of the Ctrl Module of SBRD.
iSBSIStat_HWID	HW_ANY	Hardware ID of the Stat Module of SBRD.
iSBSIData_HWID	HW_ANY	Hardware ID of the Data Module of SBRD.
xEnable	BOOL	FALSE – Disable the Function Block. TRUE – Enable the Function Block.
xTrigger	BOOL	TRUE – Rising Edge (Low ==> High) triggers the Vision Sensor.

NAME	DATA TYPE	DESCRIPTION
xTriggerExt	BOOL	TRUE – Hardware Trigger or free run enabled.
		FALSE – Hardware Trigger or free run disabled.
uiJobNumber	BOOL	Gives the active job number of the SBRD. If the value doesn't equal with the active job number ,then the request for job change will be triggered automatically.

Table 5.1: FB_CheckSBSI Input Data

OUTPUT DATA

NAME	DATA TYPE	DESCRIPTION
xEnabled	BOOL	TRUE – Function Block is enabled FALSE - Function Block is disabled
xReady	BOOL	FALSE – SBRD is not ready for next evaluation cycle. TRUE – SBRD is ready for next eval- uation cycle.
xTriggerAck	BOOL	FALSE – No acknowledge for a successful trigger to SBRD. TRUE – Acknowledge for a successful trigger to SBRD.
xPartChecked	BOOL	FALSE – SBRD is busy in operation. TRUE – SBRD is waiting for next command.
aData	ARRAY[0257] OF BYTES	 BYTE 0 – Gives the Image ID of the job being exe- cuted. Image ID is incre- mented with each job exe- cution independent from trigger source. BYTE 1 – Bit0 of this byte has following values. Bit0 is 1 means Data Overrun = Data truncated. Bit0 is 0 means No Data overrun. BYTE 2 to BYTE 257 - Data as defined in CCS- Configuration Studio in I/O Configuration
xError	BOOL	FALSE – No Error during SBRD oper- ation.
		TRUE – Error during SBRD operation.

NAME	DATA TYPE	DESCRIPTION
uiErrorld	BOOL	Gives the ID of the error occured. It has following values.
		0 – No Error.
		1 – Failure Trigger request
		2 – Failure Change Job.
		3 – Failure switch to run.
		5 – Failure Profinet Not active in Job.
		15 – System Error
tTimeTotal	TIME	Time period for which the SBRD is busy.

Table 5.2: FB_CheckSBSI Output Data

9 INTEGRATION OF FUNCTION BLOCKS INTO PROJECT

9.1 FB_CheckSBSI

Drag and drop the FB_CheckSBSI function block to the TIA portal to the Main(OB1) as shown below.



→

 \rightarrow

 \rightarrow

 \rightarrow

NOTE

Refer Table 5.2 in Chapter 8.1 to get detailed description of the Inputs and Outputs to be configured for the Function Block.

The following are the inputs, the user has to configure properly :

1. iSBSICtrl_HWID : The hardware ID of the Ctrl module must be given to this input .

NOTE

• Refer Chapter 6.5 to get detailed description on how to identify the Hardware ID of iSBSICtrl_HWID module in TIA Portal.

2. iSBSIStat_HWID: The hardware ID of the Stat module must be given to this input.

NOTE

- Refer Chapter 6.5 to get detailed description on how to identify the Hardware ID of iSBSIStat_HWID module in TIA Portal.
- 3. iSBSIData_HWID: The hardware ID of the Data module must be given to this input.

NOTE

• Refer Chapter 6.5 to get detailed description on how to identify the Hardware ID of iSBSI-Data_HWID module in TIA Portal.

4. xEnable :

In order to make the Function Block operational make this input **TRUE**. In order to disable the operations of this Function Block make this input **FALSE**.

5. uiJobNumber:

The job which the Vision Sensor has to execute has to be given in this input. If this value doesn't equal with the Active job number of the vision sensor then the request for changing job number will be triggered automatically.

6. After the Hardware ID's of the modules are added the Function Block overview will appear as shown below.



10 FUNCTION BLOCK EXECUTION WITH AN EXAMPLE

This chapter will explain the following in detail:

- 1. To demonstrate the FB execution with an example where we have to detect a position and a datamatrix code using a SBRD Vision System. As configured in chapter 3.
- 2. Prepare the SBRD Vision System in to monitor the results in CCS Configuration software.
- 3. Creating watch tables in TIA portal to monitor the following :
 - Data sent from the SBRD in the telegram.
 - Status of the SBRD.
- 4. Mapping the result data configured in vision configuration studio with the array of data obtained as an output of the Function Block **FB_CheckSBSI**.

10.1 Prepare the SBRD Vision System to monitor the results in CCS-software..

1. Open CCS software in Monitor device operation ...

	New job Create a new job
	New job on device Establish connection, switch device to Configuration mode and create an new job
	Open job from file Open an existing job from a file
	Load job from device (Run mode) Establish connection and load a job from device, device remains in Run mode
	Load job from device Establish connection, load a job from device and then switch device to Configuration mode
® 7	Monitor device operation Establish connection, load active job from device and monitor device operation, device remains in Run mode

2. Select the connected device:

> 0.K



3. Image Trigger

- Click on Trigger button
- Select the right camera e.g 1. In Record view
- Select the xSBlob tool in Results overview

Then the display show the image with the results. There were 2 result format available. The Value which is in pixel and the Transformed, which is in mm.

These results will be compared with the data on the Siemens controller in the following description.



Place a sample of a data matrix code into the viewing area. Do again a trigger and check the results.

	Monitor *New project - Festo	Camera Configuration Studio 1.1.19323			_ 0	×
File View Monitor	Recording File recording				FESTO	۵
Periodical trigger Trigger 1000 ms tinter						
Connected device <	Record view	×	Results overview		×	
SBRD-Q, F/W v1.1 🖓 🗂 🕆 🌣 🕆 🜖	1 - آ	X [pixel] 2359	Name	Value	Transformed	
192.168.0.224 Discourse	Que 14.1	Y [pixel] 1472	8 xSBLOB: xSBLOB			
Connected			1. X center of gravity	682.26	51.09	
Job: 1. Profinet-SBRD 🗮 🚯			2. Y center of gravity	359.31	29.27	
Job navigator <	KDATACODE		3. Code data	Bernd;Schmid;Deutschland;		
Monitor device			4. X center	716.15	54.20	
 Monitor active job on device in run mode Evaluate results and processing times 			5. Y center	424.32	35.53	
Managalaha			6. Angle	12.99	13.99	
Manage jobs						
		# # 🔂 🖸 📜 🔾 — 23%				_

If this tests were successful, keep the SBRD and the CCS-software in this status!

If the results were not o.k, then the configuration has to be improved and adjusted. Then change to Edit job Mode:



Then the settings of the camera and the inspection could be configured, as shown in chapter 3.

10.2 Example description in TIA Portal

- 1. Integrate the Function Block FB_CheckSBSI as explained in Chapter 9.
- 2. Create a watch table.



- 3. Give a name to the watch table. Here in our example we have named the watch table as SBRD-Dataoutput.
- 4. Add the **aData** output of the **FBCheckSBSI.** Add all the 258 array elements of aData to the watch table for testing purpose.

5. Add the first element of the array aData to the watch table as shown below.

22 1 1/2 1/2 1/2 Display format Monitor value Modify i Name Addres FB "FB_CheckSBSI_DB Instance DB of ... DB1

First you can type the name of the FB and then select the shown entry

Then scroll down and select the aData array:

TS	TST-Profinet_SBRD → PLC_1 [CPU 1215FC DC/DC/DC] → Watch and force tables →											
Ý	🤨 u	1 10 1 1	27 °°° °°°									
	i 1	Name	Address		Display format		Monitor value	-	Mod			
1		CheckSBSI_DB". 🔳			Hex	-						
2		None										
	-	🔟 aData[]	←	Ar	ray[0257] of			Resu	lt data			
	-	🔟 ilmageld		Int	t							
	-	🤟 iPrevImageID		Int	t							
	-	iRetVal_Ctrl		Int	t							
	-	🤟 iRetVal_Data		Int	t							
	-	🔟 iRetVal_Stat		Int	t							
	-	isbsictrl_HWD		H١	N_ANY			Hard	ware			

Now it should appear as shown:

N	-Profir	net_SBRD PLC_1 [CPU 121]	5FC DC/DC/DC])	Watch and fo							
🛫 🛫 🍂 🌆 🌮 18 🕫 🕫 🕫											
	i	Name	Address	Display format							
1		"FB_CheckSBSI_DB".aData[0]		Hex							
2			<add new=""></add>								

6. Click the corner of the 1st element and when a "+" mark appears drag the cursor down until all 256 elements of the array are added to the watch table.

TST-Profinet_SBRD → PLC_1 [CPU 1215FC DC/DC/DC] → Watch and for											
NS											
学 🛃 🎼 🦻 10 🕫 17 🕫 🕫 🖤											
	i	Name	Address	Display format							
1		"FB_CheckSBSI_DB".aData[0]		Hex							
2			<add new=""></add>								

7. Once the array elements are added the watch table looks as shown below.

15													
2													
	i	Name	Address	Display format	Monitor val	Modify va	9	Comment					
1		"FB_CheckSBSI_DB".aData[0]		Hex				Image ID					
2		"FB_CheckSBSI_DB".aData[1]		Hex				Reserved					
З		"FB_CheckSBSI_DB".aData[2]		Hex									
4		"FB_CheckSBSI_DB".aData[3]		Hex									
5		"FB_CheckSBSI_DB".aData[4]		Hex									
6		"FB_CheckSBSI_DB".aData[5]		Hex									
7		"FB_CheckSBSI_DB".aData[6]		Hex									
8		"FB_CheckSBSI_DB".aData[7]		Hex									
9		"FB_CheckSBSI_DB".aData[8]		Hex									
10		"FB_CheckSBSI_DB".aData[9]		Hex									
11		"FB_CheckSBSI_DB".aData[10]		Hex									
12		*FB_CheckSBSI_DB*.aData[11]		Hex									
13		"FB_CheckSBSI_DB".aData[12]		Hex									
14		"FB CheckSBSI DB".aData[13]		Hex									

8. The first 2 data in the payload are reserved for internal data. (see manual) So configure the display format of Byte2 to Byte (x) as **Hex** for all <u>values</u> as configured in the CCS dataoutput for Profinet. For all String data as configured in the CCS dataoutput set the display format to **Char**.

TS	TST-Profinet_SBRD → PLC_1 [CPU 1215FC DC/DC/DC] → Watch and force tables → Watch table_1										
-											
1	<i>≇ ≇ 12 </i> 1 ₀ <i>9</i> ₁ <i>9</i> ₀ <i>2</i> ₽ ∞ ∞										
	i	Name	Address	Display format	Monitor val	Modify va	9	Comment			
1		"FB_CheckSBSI_DB".aData[0]		Hex				Image ID			
2		"FB_CheckSBSI_DB".aData[1]		Hex				Reserved			
з		"FB_CheckSBSI_DB".aData[2]		Hex				x Coordinate			
4		"FB_CheckSBSI_DB".aData[3]		Hex				x Coordinate			
5		"FB_CheckSBSI_DB".aData[4]		Hex				x Coordinate			
6		"FB_CheckSBSI_DB".aData[5]		Hex				x Coordinate			
7		"FB_CheckSBSI_DB".aData[6]		Hex				y Coordinate			
8		"FB_CheckSBSI_DB".aData[7]		Hex				y Coordinate			
9		"FB_CheckSBSI_DB".aData[8]		Hex				y Coordinate			
10		"FB_CheckSBSI_DB".aData[9]		Hex				y Coordinate			
11		"FB_CheckSBSI_DB".aData[10]		Character				Begin Data matrix Code			
12		"FB_CheckSBSI_DB".aData[11]		Character							
13		"FB_CheckSBSI_DB".aData[12]		Character							
14		*FB_CheckSBSI_DB*.aData[13]		Character							
15		*FB_CheckSBSI_DB*.aData[14]		Character							
16		"FB_CheckSBSI_DB".aData[15]		Character							

Information about the memory allocation for the dataoutput gives the CCS. (I/O Configuration)

Connected device	<	I/O settings ×	I/O resu	ults ×				
[Co\nection required] 👘 🔻 🌣	. 0	Data sections:				1		
(b) 192.168.0.224 Not connected Connect		Name	Name		Position [B	Data (hex)	Data	
		Image ID		byte	0	04	4	
Device mode: Configure	2	Result status (:1 data o	verrun)	byte	1	01	1	
[Connection required]	-	X center of gravity		float32	25	D4 5C 61 42	56.3407	
Job: [Connection required] ;=		Y center of gravity		float32	69	EA CF F8 41	31.1015	
Job navigator «		Code data		string	1073	42 65 72 6E 64 3B 53 63 68 6D 6	9 Bernd;Schmid;Deutschland;	
1. Set up	~							
2. Configure cameras	~							
3. Acquire records	~	Data:						
4. Prepare inspection	~	04 01 D4 5C 61 42 8 0A 00 00 00 00 00 00 00 00 00 00	EA CF F8 00 00 00	41 42 65 00 00 00	72 6E 64 3 00 00 00 0	3 53 63 68 6D 69 64 3B 44 0 00 00 00 00 00 00 00 00 00	65 75 74 73 63 68 6C 61 6E 64 00 00 00 00 00 00 00 00 00 00 00	3B 00
5. Inspect objects	~							
6. Configure I/O	^							

9. For test purpose the function block could be controlled by the watch table. The inputs XEnable, uiJob-Number and xTrigger have to be assigned to the watch table. With the button "Insert row" an empty row will be inserted:



Insert 3 rows and assign the 3 inputs:

TST	TST-Profinet_SBRD → PLC_1 [CPU 1215FC DC/DC/DC] → Watch and fe										
ý	学 👻 🎼 💋 ሌ 🕫 🍞 🚏 📬										
	i	Name	Address	Display format							
1		*FB_CheckSBSI_DB*.xEnable		Bool							
2		*FB_CheckSBSI_DB*.uiJobNumber		DEC							
3		*FB_CheckSBSI_DB*.xTrigger		Bool							
4		*FB_CheckSBSI_DB*.aData[0]		Hex							
5		"FB_CheckSBSI_DB".aData[1]		Hex							
-		the of the set of the test									

Test:

1. Download the configuration to the PLC and set to Run mode.

Step in the watch table and activate: Monitor all.

SBRD in Monitor mode and inspection part is in the field of view.

2. Enable the Function Block. This is done by making **xEnable = TRUE**.

	Select tl	he xEnable right mouse	e click > I	Modify to 1									
	TST-Profir	net_SBRD → PLC_1 [CPU 1215F] 🕨 Watch and f	force tables 🕨	SBR	D-Dataoutput						
I													
										_			
	<i>₹ ∎</i>			1									
	i	Name	Address	Display format	Monitor value	N	lodify value	4	Comme	nt			Tag (
I	1	"FB_CheckSBSI_DB".xEnable		Bool 👥 💌	FALSE	F	ALCE		`				Engl
	2	"FB_CheckSBSI_DB".uiJobNumber		DEC	1	М	odify		•		Modify to 0	Ctrl-	+F3
	3	"FB CheckSBSI DB".xTrigger		Bool	FALSE	PP M	onitor all		Ctrl+T		Modify to 1	Ctrl-	+F2
	4	"FB CheckSBSI DB".aData[0]		Hex	16#03	M 100	onitor now			2	Modify now	Shift-	+F9
	5	"FB_CheckSBSI_DB".aData[1]		Hex	16#00		cost row		Ctrl - Entor	1%	Modify with trigger	Ctrl+Shift-	+F9
	6	"FB_CheckSBSL_DB" aData[2]		Hex	16#D6	100 m	d row		Alt los	25	Enable peripheral o	utputs	
	7	"FB_CheckSBSI_DB" aData[3]		Hey	16#34	- ~ ~	101000		AIL+IIIS	ate			Reci
	·	"FR_CheckSBSI_DB .aData[4]		Hav	16#19	Jin In	sert comment line						Deer
	0	FB_CHECKSBSI_DB .aData[4]		nex	10#10	V.O	.+		CtrluX	Id Lt	•		Rest
I	9	"FB_CheckSBSI_DB".aData[5]		Hex	16#44				Cul+X	hate	•		Resu
I	10	"FB_CheckSBSI_DB".aData[6]		Hex	16#EB	l 🗐 🖸	рру		Ctrl+C	hate	2		Resu
	11	"FB_CheckSBSI_DB".aData[7]		Hex	16#B4	Pa Pa	iste		Ctrl+V	hate			Resu

90

3. Toggle input **xTrigger = 1.** In the same way as xEnable

- [ST-Profinet_SBRD → PLC_1 [CPU 1215FC DC/DC/DC] → Watch and force tables → SBRD-Dataoutput ¥ **1** 1 1/2 1/2 1/2 1/2 1/2 1/2 i Name Address Display format Monitor value Modify value 9 Comment \checkmark "FB_CheckSBSI_DB".xEnable TRUE TRUE 1 Bool _ ▲ "FB_CheckSBSI_DB".uiJobNumber DEC 2 *FB_CheckSBSI_DB*.xTrigger 3 Bool TRUE TRUE 🗹 🛕 "FB_CheckSBSI_DB".aData[0] 4 Hex 16#0E Image ID 5 "FB_CheckSBSI_DB".aData[1] Hex 16#00 Reserve 6 "FB_CheckSBSI_DB".aData[2] Hex 16#33 x Coordinate 1. Datablock "FB_CheckSBSI_DB".aData[3] 16#00 7 Hex x Coordinate x-coordinate 8 "FB_CheckSBSI_DB".aData[4] Hex 16#00 x Coordinate 9 "FB_CheckSBSI_DB".aData[5] Hex 16#00 x Coordinate 10 "FB_CheckSBSI_DB".aData[6] 16#29 Hex y Coordinate 11 "FB_CheckSBSI_DB".aData[7] Hex 16#00 2. Datablock y Coordinate 12 "FB_CheckSBSI_DB".aData[8] 16#00 y-coordinate y Coordinate Hex "FB_CheckSBSI_DB".aData[9] 13 Hex 16#00 y Coordinate 14 "FB_CheckSBSI_DB".aData[10] Characte Begin data matrix code 'B 15 "FB_CheckSBSI_DB".aData[11] Charact 'e "FB_CheckSBSI_DB".aData[12] 16 Charag er 17 "FB_CheckSBSI_DB".aData[13] Character 'n 18 *FB_CheckSBSI_DB*.aData[14] Cha cter 'd' 19 "FB_CheckSBSI_DB".aData[15] Character 3. Datablock 20 "FB_CheckSBSI_DB".aData[16] Cł aracter 's' String result 21 "FB_CheckSBSI_DB".aData[17] haracter 'c' "FB_CheckSBSI_DB".aData[18] 'h' haracter 23 "FB_CheckSBSI_DB".aData[19] Character 'm 24 "FB_CheckSBSI_DB".aData[20] Character 25 "FB_CheckSBSI_DB".aData[21] 'd' Character 26 "FB_CheckSBSI_DB".aData[22] Character 27 "FB_CheckSBSI_DB".aData[23] Character 'D' 28 "FB_CheckSBSI_DB".aData[24] Character
- 4. Observe the data received in the aData output of the FB.

• The online payload data values of TIA portal match with the Results of the CCS data output I/O results:

I/O settings ×	I/O results ×						I/O structure			х
Data sections:							Digital I/O:			
Name	Туре	Positior	Data (ex)		Data		Туре	Assigned value		
Image ID	byte	0	04		4		Digital inputs			
Result status (:1 data ove	errun) byte	1	0		1		Digital outputs			
X center of gravity	int32	25	33 00 00 00		51					
Y center of gravity	int32	69	29 00 00 00		41					
Code data	strin <u>c</u>	107:	42 65 72 6E 64 3B 53 63	68 6D 69	Bernd;Schmid;Deutschland;					
Data:							Protocol-based I/O:			
04 01 33 00 00 00 29 0A 00 00 00 00 00 00	00 00 00 42 6	5 72 6E	64 3B 53 63 68 6D 6	9 64 3B 4 0 00 00 0	44 65 75 74 73 63 68 6C 61 00 00 00 00 00 00 00 00 00	6E 64 3B 00 00 0	Type Id	Description		
00 00 00 00							Profinet Data	Profinet		
Record view ×	Tolerance range	s × 🞝	Results overview 🗴		Tool structure					×
A Automatic T			X [pixel]	1572	Name	Refs.				
1000 Advonatic			Y [pixel]	1033	88 xSBLOB: xSBLOB	S				
IDAIAGODE			Hue	0	XDATACODE: xDATACOD	DE 🔗				
800										
					Tool settings × Too	ol results ×				
	See				Name	Value	Tra	ansformed Unit	Dev.	Refs
600	177412				SS xSBLOB: xSBLOB			-		^
	the second	4 Devischlan	j		1. X center of gravity	680.15	50.69) pixel	49.15 %	
400					2. Y center of gravity 4	478.25	40.61	pixel	172.97 %	
					*** xDATACODE: xDATACODE					^
200					3. Code data	Bernd;Schmid;De	utschland;		0.00 %	8
					4. X center 6	668.67	49.57	pixel	-178.94 %	
0 200 400	600 8	00 # # E	1000 1200 14	00	5. Y center 4	495.61	42.25	j pixel	516.37 %	
		+ 47		51/0						

The data 33h equals to 51 dec which is rounded due to int.

10.3 Payload Data Mapping between TIA Portal and Camera Configuration Studio.

This chapter explains how the dataoutput configured in CCS software and the data appearing in TIA portal (aData output of the FB)

The topic is that Festo device send the data in different Byte order than the Siemens work.

1. Consider in the example above we have configured the result value as 32 bit int. data format for the coordinates and string for the code.

I/O settings ×	I/O results 🗙							
Profinet								
General ———								
Description Profinet								
Assignment								
Available functions and	data		Assigned data					
Tool results		*	byte: 8 bit	(0) ~				
▷ 8 ×SBLOB: ×SBLO ▷ 3 ×DATACODE: ×I	B DATACODE		float: 32 bit	(0) ~				
			int: 32 bit	(2) ^				
			©8xSBLOB:xSBLOB 1. X center of gravity	Value (trans.) 💌				
			8xSBLOB:xSBLOB 2. Y center of gravity	Value (trans.)				
			string: 64 x 8 bit	(1) ^				
			器 xDATACODE: xDATACODE 3 . Code data	Value (text) 🛛 🔻				

With the "small" value (trans) it was easy to compare the data. If the numbers were bigger we have to care for the Byte order! Siemens work on different Byte oder (Motorola) than our Festo Devices! (Intel)

In next example we configure the value in pixel.

	-	-	-		
<mark>88 x</mark> 8	SBLOB: xSBLOB				
	1. X center of g	ravity 675.76	50.27	pixel 4	17.81 %
ata block	< in Tia show:		-		
heckSBSI_I	DB".aData[2]	Hex	16#A4		

The d

"FB_CheckSBSI_DB".aData[2]	Hex	16#A4	x Coordinate
"FB_CheckSBSI_DB".aData[3]	Hex	16#02	x Coordinate
"FB_CheckSBSI_DB".aData[4]	Hex	16#00	x Coordinate
"FB_CheckSBSI_DB".aData[5]	Hex	16#00	x Coordinate

The Question is what is the correct Byte order?

A4 02 or 02 A4

02 A4 is the correct answer = 676 > So the lowest Byte appear first!

Other example:				
"FB_CheckSBSI_DB".aData[2]	Hex	16#37		x Coordinate
"FB_CheckSBSI_DB".aData[3]	Hex	16#1F		x Coordinate
"FB_CheckSBSI_DB".aData[4]	Hex	16#03		x Coordinate
"FB_CheckSBSI_DB".aData[5]	Hex	16#00		x Coordinate
		Value		
	3			
37 1F 03 00 > 00 03 1F 37	' = 204599 in CCS >	2.04599e+005		

2. Conversion of the Byte order

To see the values in the correct form, the sequence of the Bytes within one data block has to be changed. There may different way to do this. Here we show very simple with some MOVE operation.

	MOVE		MOVE		MOVE			MOVE	
N	EN ENC 16#37 "FB_CheckSBSI_ DB".aData[2] IN # OUTI	16#37 16#1F *D82.D8B3 *F8_CheckS851_ *Conversion*. D8*.aData[3] — •	IN * OUT1	16#1F 16#03 %DB2.DBB2 *FB_CheckSB5L *Conversion*. DB*.aData[4] - 	IN * OUT1	16#03 "FB_Che %D82.DB81 "FB_Che "Conversion". D8".a XValue[1]	EN 2ckSBSI_ 3Data[5] — IN	ENO * OUTI	16#00 %DB2.DBB0 "Conversion".

he idea is to move the single Byte from the a.Data to an Datablock array with 4 Bytes. The first Byte will be moved to the highest array position. The second to the second highest and so on... Then the Datablock could be interpreted as an double word number with the correct value!

High Byte	"FB_CheckSBSI_DB".aData[2]	Move	xValue[0]	High Byte
	FB_CheckSBSI_DB.aData[3]		xValue[1]	Byte
	"FB_CheckSBSI_DB".aData[4]		xValue[2]	Byte
Low Byte	"FB_CheckSBSI_DB".aData[5]	-	xValue[3]	Low Byte

This is very important especially when the data are transferred from the camera in Float 32 (REAL). Then the interpretation of the Hex numbers, and verify with the Decimal display in the CCS software, are not easy! Float 32 is the common data format for the values of coordinates, because of the possibility of comma values!

At last the array from the data block (DB02) move into a "Memory Double Word" MD0 which could be interpreted as a Real.

