Weidmüller 🗲

u-remote

Quick Start Guide for getting started with Profinet applications

Abstract:

The first steps in Profinet and PROFIsafe applications with Siemens TIA-Portal

Hardware reference

No.	Component name	Article No.	Hardware / Firmware version			
Field	Fieldbus couplers					
1	UR20-FBC-PN-IRT	1334880000	Discontinued			
2	UR20-FBC-PN-IRT-V2	2566380000				
3	UR20-FBC-PN-IRT-ECO	2659680000				
UR2	UR20 - Profisafe modules					
4	UR20-4DI-4DO-PN-FSPS-V2	2464570000				
5	UR20-8DI-PN-FSPS-V2	2464590000				
UR2	UR20 – IO modules					
6	UR20-x	See description in corresponding chapter				

Software reference

No.	Software name	Article No.	Software version
1	SIEMENS TIA Portal		V~15 (was used to create this document)
2	Weidmüller CPD-Tool		V2

Contact

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For any further support please contact your local sales representative: <u>https://www.weidmueller.com/countries</u>

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1 Warning and Disclaimer

Warning

Controls may fail in unsafe operating conditions, causing uncontrolled operation of the controlled devices. Such hazardous events can result in death and / or serious injury and / or property damage. Therefore, there must be safety equipment provided / electrical safety design or other redundant safety features that are independent from the automation system.

Disclaimer

This Application Note / Quick Start Guide / Example Program does not relieve you of the obligation to handle it safely during use, installation, operation and maintenance. Each user is responsible for the correct operation of his control system. By using this Application Note / Quick Start Guide / Example Program prepared by Weidmüller, you accept that Weidmüller cannot be held liable for any damage to property and / or personal injury that may occur because of the use.

Note

The given descriptions and examples do not represent any customer-specific solutions, they are simply intended to help for typical tasks. The user is responsible for the proper operation of the described products. Application notes / Quick Start Guides / Example Programs are not binding and do not claim to be complete in terms of configuration as well as any contingencies. By using this Application Note / Quick Start Guide / Example Program, you acknowledge that we cannot be held liable for any damages beyond the described liability regime. We reserve the right to make changes to this application note / quick start guide / example at any time without notice. In case of discrepancies between the proposals Application Notes / Quick Start Guides / Program Examples and other Weidmüller publications, like manuals, such contents have always more priority to the examples. We assume no liability for the information contained in this document. Our liability, for whatever legal reason, for damages caused using the examples, instructions, programs, project planning and performance data, etc. described in this Application Note / Quick Start Guide / Example is excluded.

Security notes

In order to protect equipment, systems, machines and networks against cyber threats, it is necessary to implement (and maintain) a complete state-of-the-art industrial security concept. The customer is responsible for preventing unauthorized access to his equipment, systems, machines and networks. Systems, machines and components should only be connected to the corporate network or the Internet if necessary and appropriate safeguards (such as firewalls and network segmentation) have been taken.

2 Accompanying documents

The following product related manuals for u-remote stations are available and can be downloaded in the support area or product catalogue on the Weidmüller website:

u-remote manual

Web server

Main manual for all ur20 fieldbus couplers and modules

English	Document No. 1432790000
German	Document No. 1432780000





IP20 modules for functional safety Manual for all safety modules				
English	Document No. 148460000			

English	Document No.	1484600000
German	Document No.	1484590000



Manual for using the webserver of all ur-20 devices					
English	Document No. 2112220000				
German	Document No. 2112210000				



Communication module UR20-4COM-IO-LINK Additional manual for the ur20 IO-Link module

English	Document No. 2547720000
German	Document No. 2547620000

Further manuals, application notes and quick start guides can also be found in the support center.

3 Profinet basics

This chapter shall introduce how a simple Profinet works, and which steps are necessary to start with a simple application in Siemens TIA Portal.

3.1 The Profinet network

In general, all participants of a Profinet (**Pro**cess **Fi**eld **Net**) network are connected via Ethernet. A simple network consists of at least one IO-controller that controls one or more IO-devices:



Topology view of a Profinet network

To program the IO-controller and parameterize the IO-devices an IO-supervisor is necessary, this is typically an engineering tool like TIA Portal. When the IO-supervisor is connected to the network it is also possible to read diagnostic data.

Most important points to make it possible for the PLC to communicate with the devices are:

1. The PLC knows the device description

In Profinet networks always the IO-controller parameterizes all IO-devices during the initialization phase.

This will also happen when parameters were set up at the webserver of the u-remote station, the parameters which shall be activated have to be chosen in the hardware configuration of the PLC project. To be able to set up these parameters the corresponding device description file must be installed (see chapter 3.2).

2. The IO-device has a device name

The IO-controller will assign the IP-addresses of the IO-devices depending on their device name or by using the LLDP protocol for advertising their identity to neighboring IO-devices (see chapter 3.3- "3. Assign the device names to the physical hardware").

3.2 Installing the device description file in TIA Portal

1.) Download the device description file for Profinet fieldbus couplers. These files can easily be found in the support center by using one of the Profinet fieldbus couplers as keyword:

8		UR20-FBC-PN-IRT-V2	x Q Search	
Selected Filter Device description	Delete Filters	All Downloads Product Ca Current GSDML file PROFINET V 2566380000 UR20-FBC-PN-IRT-V2	2 coupler Downloads	n Video Tutorial
Software Downloads 12	^	 ⊕ Select File 		
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Library Driver	3	Showing 2 items	ltems p	er page: 100 👻 < >

2.) Unzip the downloaded archive to a local folder.

Make sure that the GSDML file (*.xml) and image files (*.bmp) are extracted to the same folder.

3.) Open the "general station description files" (GSD) manager in TIA Portal:



4.) Search for the local folder which contains the GSDML file:

Manage general station de	scription files			×	1
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5.) Use the checkbox to select the just added and "not yet installed" GSDML file and klick on "Install":

Source path: C:\Desktop\PN	Firmware\GSDML			
Content of imported path				
File	Version	Language	Status	Info
GSDML-V2.35-WI-UR20-202110	011 V2.35	English, Ger	Not yet installed	Profinet De
<		III		

The name of the GSDML file has always the same structure:

GSDML-V2.35[GSDML schematic version] -WI[manufacturer name: Weidmüller Interface] -UR20[device family name: u-remote IP 20] -20211011[date of release: October 11, 2021].xml

6.) Wait until the installation process has been completed successfully and close the description file manager. An update of the hardware catalogue will automatically be performed afterwards.

Now the fieldbus couplers can be found in the following subfolders of the Hardware catalog:

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UR20-FBC-PN-IRT Profinet Device	ask
UR20-FBC-PN-IRT Profinet Device with Status Wor	d v
UR20-FBC-PN-IRT-V2 Profinet Device	
UR20-FBC-PN-IRT-V2 Profinet Device with Status V	
• 🛄 Sensors	Lib
PROFIBUS DP	

3.3 Create a new project in TIA Portal

This chapter is intended to provide an introduction about the general use of Profinet devices which are manufactured by Weidmüller in TIA-Portal. The following 5 steps are necessary to start with your application:



1. Create a new project

As soon as TIA Portal was started the portal view will be displayed

- 1. Click on "Create a new project"
- 2. Enter a name for the project to be created
- 3. Click on "Create"

Ms Siemens			_ 0	×
			Totally Integrated Automation PORTAL	
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Online & Diagnostics	First steps			
Diagnosues	Installed software			
	🔵 Help			
	🚱 User interface language			
Project view				

2. Setup the hardware configuration

The "first steps" for the just created project are displayed, click on "configure a device":





Choose "Add a new device" and select the CPU that is used in your application:

Click on "Add" and TIA Portal should automatically change to the project view:

Project de fore de la constancia de la c	Image: Topology view connew National 0 NBO(L_1) A2,1 HKC_1 HKC_2 HKC_3 HKC4,6 HKC5,8 HKC5,8 HKC4,8 HKC5,8 HKC5,8 HKC5,8 HKC4,8 HK73 HK73 HK73 HK74	Size I addit 103 102 101 1 1 0 1.2 646 1.3 100 1.1 0 1.2 646 1.16 1000 1.17 1004 1.18 1008 1.19 1012 1.20 1016	10 10 10 10 10 100010 100210 100410	CPU 12 D18D A12 HSC HSC HSC HSC HSC HSC HSC HSC HSC L Pulse g Pulse g Pulse g Pulse g Pulse g	Options Catalog
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Set up the network settings of the PLC

Click on the network interface in the "Device view". Open the properties for the Ethernet addresses of the interface where the Profinet network shall be connected to:

- 1. Add a new subnet for the Profinet network (PN/IE)
- 2. Enter the IP address of the PLC and the corresponding subnet mask
- 3. Optional the device name of the PLC could also be changed

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Set up a new Profinet device

In this sample project a UR20-FBC-PN-IRT-V2 fieldbus coupler shall be connected. For further devices the same procedure must be repeated. The network settings that shall be used are shown in the network diagram below:



Network diagram of this sample project

The ethernet interface of the PLC has already been configured in the step before, therefore the fieldbus coupler can simply be added.

QSG000044v00_2022/12

Open the "Network view" and search for the fieldbus coupler in the device tree (see chapter 3.2). Move the device via drag and drop or double-click to the working area of the network configuration:

MyProfinetProject > Devices & networks		_ = = X Ha	ardware catalog	
	🖉 Topology view 🛛 🛔 Network view	Device view Op	ptions	
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			 Weidmüller Interface GmbH & Co. KG III UR20 System 	
PN/IE_1			UR20-FBC-PN-ECO Profinet Device	
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			UR20-FBC-PN-IRT Profinet Device	with Status Word
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	Comment:	^		
		Ar	rticle no.:	
1		Ve Ve	ersion: (GSDML-V2.35-WI-UR20-20211011.XN	4L) 💌
	Author: w010372		escription:	
		5.67 M	eidmüller UR20-FBC-PN-IRT-V2 Profinet Device with St	tatus Word (Order
			umber 2566380000)	, order
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It is possible to use different versions of the device description file. The version that will be used in the project can be selected in the information field of the hardware catalogue.

In order that the devices communicate with each other the fieldbus coupler must be assigned to the related PLC, click on "Not assigned" and select the Profinet interface of PLC_1:



In the last step of this section the network settings of the fieldbus coupler must be adjusted.

- 1.) Click on the symbol or change to "Device view" for the coupler: Select "PROFINET interface [X1]
- 2.) If necessary, change the IP address which will be assigned by the PLC based on the device name
- 3.) For changing the device name disable the checkbox "Generate PROFINET device name automatically". In this case the automatically generated name already matches with the that one from the network plan:

MyProfinetProject > Devices & net	works			_ # # ×
		🚰 Topology view	Network view	Device view
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 General Catalog information PROFINET interface [X1] General Ethernet addresses Advanced options	IP protocol	Use router Router addr	ess: 192 . 168 . 2 ask: 255 . 255 . 25 outer settings with IO co	i5 . 0 ontroller
	PROFINET PROFINET device na Converted na Device num	ame: ur20-fbc-pn-irt-v2 ame: ur20-fbc-pn-irt-v2		omatically 3.

Now the network configuration of this project has been finished.

Add I/O modules to the hardware configuration

I/O modules can be added in the device view of each fieldbus coupler:



The module parameters can be changed in the properties of each module.

In addition to the various groups of modules there are some follower modules with three points at the beginning available:



These modules can be used to save process data bytes by using them combined with another module that also only uses a nibble of a process data byte, for example:

*	Module	Rack	Slot	I address	Q address	
	 UR20-FBC-PN-IRT-V2 	0	0	12		
	UR20-FBC-PN-IRT Profine	0	O IF			
	UR20-16DI-P_1	0	1	34		
	UR20-4DI-P_1	0	2	5		1 Byte process data
	UR20-4DI-P_2	0	3	6		1 Byte process data
	UR20-4DI-P_3	0	4	7		1 Byte process data
	UR20-4DI-P_1	0	5			i byte process data
	UR20-4DI-2W-230V-AC_1	0	6	8		

After having selected the modules in the same number and order like they are present in the physical hardware station the project is ready to be transferred to the PLC.

3. Assign the device names to the physical hardware

In delivery state normally the device name of Profinet fieldbus couplers is empty. For this reason, the device name which is configured in the hardware configuration of the project must be assigned manually.



Automatically assignment of the device names is also supported by activating LLDP mode in the properties of the PLC and the fieldbus coupler and linking the devices in the topology view.

To be able to assign the device names a connection between TIA Portal and the Profinet network must be present. For the first connection an automatic scan for all devices in the network can be executed by searching for "Accessible devices":

Project Edit View Insert	Online Options Tools Window Help	
📑 📑 🔒 Save project 🔒	💋 Go online	Ctrl+K ne 🖉 Go offline 👪 🖪 🖪 🛠 🖃 🛄 <search< th=""></search<>
Project tree	💋 Extended go online	
	📓 Go offline	Ctrl+M
Devices	I Simulation	•
E	Stop runtime/simulation	
	Download to device	Ctrl+L
 MyProfinetProject 	Extended download to device	
Add new device	Download and reset PLC program	
🖉 💼 Devices & networks	Download user program to Memory Card	
PLC_1 [CPU 1212FC	Snapshot of the actual values	
Ungrouped devices	Load snapshots as actual values	
Security settings	Load start values as actual values	
🕨 🏹 Common data		
Documentation set	Upload from device (software)	
🕨 🚺 Languages & resou	Upload device as new station (hardware and softwa Backup from online device	are)
🔻 🙀 Online access	Hardware detection	and the second
🍸 Display/hide interfac		
COM <5> [RS232/PPI]	HMI Device maintenance	
COM <4> [RS232/PPI	Accessible devices	Ctrl+U
COM <3> [RS232/PP]		Shift+E
FAP-Windows Adapte	Ston CPU Ctrl-	Shift+O
 ASIX AX88772B USB 		
Dpdate accessib	🗓 Online & diagnostics	Ctrl+D
Display more info	ormation	

After the scan process has been finished this tool will create a list of all Profinet devices that were found in the network. By clicking on "Show "the "Online access" folder in the "Project tree" will be expanded. This can also be done directly and by clicking on "Update accessible devices..." the list will be updated:



Each device is displayed by its own subfolder. All devices without an assigned device name will be displayed as "Accessible device" together with its MAC-address:

- 1. Expand the subfolder and click on "Online & diagnostics"
- 2. Choose the function "Assign PROFINET device name"
- 3. Enter the device name which is configured in the hardware configuration for this device
- 4. Click on "Assign name"

Project tree II 🗸X AX88772B USB2.0 to Fast	t Ethernet Adapter + Accessible device [00-15-7E-19-C3-4F] + Accessible device [00-15-7E-19-C3-4F] 💦 🕳 🖬 🗮
Devices	
∰ I Diagnostics General	Assign PROFINET device name
Myhrofinethroject Contine access Online datess Online datess Online datess Online datess Online datess Online datespace Online datespace	Configured PROFINET device PROFINET device name: Device filter Only show devices of the same type Only show devices with tad parameter settings Only show devices with trad parameter settings Only show devices the network:
	IP address MAC address Device PROFINET device name Status
< IIIIIII	C III Assign name 4.

Go back to the "Project tree" and click on "Update accessible devices..." again to refresh the list, the subfolder should contain the device name now:



Alternatively, the device names can also be assigned in the "Network view":

- 1. Right click on the PN-Network connection, select "Assign device name"
- 2. Choose the network interface
- 3. Select the device from the hardware configuration
- 4. Click on "Update list", select the corresponding IO-device in the accessible device list and click on assign name

MyProfinetProject Devices & networks	_ ₽ ■ X Hardware catalog
	🚰 Topology view 🔥 Network view 🛛 🙀 Device view 🛛 Options
💦 Network 🔢 Connections HAII connection 💌 🗱 👯 🔛 💷 🍳 ±	Network overview Connections
	A Type Address in su V Catalog
	■ Search
PLC 1 UR20-FBC-PN-1	PLC_1 CPU 1212FC DC/DC/DC Filter Profile: All>
CPU 1212FC UR20-FBC-PN-IR Highlight IO system:	Assign PROFINET device name.
C II Coss-references Computing Coss-references Coss	Configured PROFINET device a. PROFILET device name: ur20-dec pnittv2 Device type: ur20-dec
	Accessible devices in the network:
I Message Go to	IP address MAC address Device PROFINET device name Status 0.0.0.0 00-15-7E-19-59-97 UR20-FBC-PN-RT - No device name assigned
Connection to PLC_1 terminated. Project closed.	0.0.0 00-15-7E-19-59-97 UR20-FBC-PN-IRT - I No device name assigned
Project closed. Project MyProfinetProject opened.	
 Start downloading to device. 	(4.)
✓ PLC_1	
 Hardware configuration 	Rash LED
PLC_1 stopped. Hardware configuration was loaded successfully. PLC_1 started. Loading completed (entror: 0; warnings: 0).	Update list Assign name
PLC_1 started.	Opence max a particular to a p
Loading completed (errors: 0; warnings: 0).	Online status information:
Search completed. 1 of 2 devices were found.	1 Search completed. 0 of 0 devices were found.
6 Search completed. 1 of 2 devices were found.	Search completed, 0 of 0 devices were found.
	Search completed. 1 of 2 devices were found.
	K III >
	· · · · · · · · · · · · · · · · · · ·
	Close

4. Download the project to the PLC

The complete project can be downloaded to the PLC now. Select the PLC in the device tree and click on the download button:



Configure the download process:

- 1. Select the interface that shall be used
- 2. Click on "Start search"

the accessible devices will be scanned again, and all PLCs found are listed

- 3. Select the matching PLC as target device for the download
- 4. Click on "Load" and follow the displayed instructions

Extended d	lownload	to	device

	Configured acce	ss nodes of "PLC_1"			
	Device	Device type	Slot Interfac	e type Address	Subnet
	PLC_1	CPU 1212FC DC/	1 X1 PN/IE	192.168.2.230	PN/IE_1
Τ		Type of the PG/PC inte		X88772B USB2.0 to Fast Ethe	ernet Ada 💌 🐨
		Connection to interface/si		X867720 0362.0 to 1831 Eline	• ()
		1st gal	teway:		- 🔊
	Select target de	vice:		Show all compatible	devices
	Device	Device type	Interface type	Address	Target device
And and a second se	PLC_1	CPU 1212FC DC/	. PN/IE	192.168.2.230	PLC_1
	-		PN/IE	Access address	-
Flash LED		-	PN/IE	Access address	-
Flash LED		-	PN/IE	Access address	2. Start search
online status informati	- ion:			Access address	2. Start search
Online status informati 무 Connection establ	ion:	vith address 192.168.2.230			2. Start search
Duline status informati ^모 Connection establ 3 Scan completed. 1	ion: lished to the device to 1 compatible devices				2. Start search messages
nline status informati 무 Connection establ	ion: lished to the device (compatible device: information	vith address 192.168.2.230 ; of 3 accessible devices fo			2. <u>Start search</u> messages

×

Check and select the actions in the "Load preview" and start the download by clicking on the "Load" button:

tatus	1	Target	Message	Action
40	9	▼ PLC_1	Ready for loading.	Load 'PLC_1'
	4	 Protection 	Protection from unauthorized access	
	4		Devices connected to an enterprise network or directly to the internet must be appropriately protected against unauthorized access, e.g. by use of frewalls and network segmentation. For more information about inductrial security, please visit http://www.siemens.com/industrialsecurity	
	0	Device configurati	Delete and replace system data in target	Download to device
	0	Software	Download software to device	Consistent download
	0	Text libraries	Download all alarm texts and text list texts to device	Consistent download
			п	

As soon as the download process has been finished successfully select "Start module" to change the operating state of the PLC in RUN mode and confirm this by clicking on the "Finish" button:

atus	1	Target	Message	Action
1	• 💁 🕶 PLC_1		Downloading to device completed without error.	Load 'PLC_1'
	4	Start modules	Start modules after downloading to device.	No action 👻
				No action Start module
			Ш	

5. Assign the process data mapping

The logical addresses of the I/O data can be found in the device overview:

)evice	overview						
**	Module	Rack	Slot	I address	Q address	Туре	Article no.
	 UR20-FBC-PN-IRT-V2 	0	0	12		UR20-FBC-PN-IRT-V	
	UR20-FBC-PN-IRT Profinet Device	0	0 IF			UR20-FBC-PN-IRT-V2	
	UR20-16DI-P_1	0	1	34		UR20-16DI-P	1315200000

To be able to assign the I/O data, the u-remote manual should be used as a guide. The process data bytes are described in the individual chapters about the fieldbus couplers and modules, like in the following examples:

Status word of the fieldbus coupler

The Status word of the fieldbus coupler is only available if the corresponding coupler was selected from the hardware catalog.

Together with the process data description from the u-remote manual the logical addresses of the project can be assigned:

			12
Byte	Bit	Name	Logical address*
	IX1.0	Summarized module diagnosis	%12.0
	IX1.1	Errorbit 1	%l2.1
IB1	IX1.2	Errorbit 2	%I2.2
	IX1.3	Systembus error	%I2.3
	IX1.4	Port 1 Link active	%12.4
	IX1.5	Port 2 Link active	%I2.5
	IX1.6	I/O-Configuration error	%I2.6
	IX1.7	Master configuration error	%I2.7
	IX0.0	MRP enabled	%I1.0
	IX0.1	MRP role	%I1.1
	IX0.2	Force mode active	%I1.2
	IX0.3	Errorbit 11	%I1.3
IDU	IX0.4	Errorbit 12	%I1.4
	IX0.5	Voltage UOUT error	%I1.5
IB0	IX0.6	Voltage UIN error	%I1.6
	IX0.7	Errorbit 15	%I1.7

Status word UR20-FBC-PN-IRT, UR20-FBC-PN-IRT-V2

* logical addresses of this sample project, see device overview

After the tags for the logical addresses have been created in the "PLC tags" of the project the I/O mapping could look like in the following watch and force table:

**	1 1 10 10 91 8 27	00 00					
i	Name	Address	Display format	Monitor value	Modify value	9	Com
// Sta	atus word of fieldbus coupler						
	"ModuleDIAG"	%12.0	Bool	FALSE			
	"ERRbit1"	%12.1	Bool	FALSE			
	ERRbit2	%12.2	Bool	FALSE			
	"ERRsystemBus"	%12.3	Bool	FALSE			
	"X1_LINKactive"	%12.4	Bool	TRUE			
	"X2_LINKactive"	%12.5	Bool	FALSE			
	"IOconfigErr"	%12.6	Bool	FALSE			
e.	"MasterConfigErr"	%12.7	Bool	FALSE			
0	"MRP_enabled"	%11.0	Bool	FALSE			
1	"MRP_role"	%11.1	Bool	FALSE			
2	"FORCEmode_active"	%11.2	Bool	FALSE			
3	"ERRbit11"	%11.3	Bool	FALSE			
4	"ERRbit12"	%11.4	Bool	FALSE			
5	*U_AUXerr*	%11.5	Bool	FALSE			
6	"U_SYSerr"	%11.6	Bool	FALSE			
7	*ERRbit15*	%11.7	Bool	FALSE			

Process input data of UR20-16DI-P module in slot 1

The mapping of I/O modules can be done in the same way:

Byte	Bit	Description	Logical address*
	IX0.0	DI 0	%13.0
	IX0.1	DI 1	%I3.1
	IX0.2	DI 2	%I3.2
IB0	IX0.3	DI 3	%I3.3
IDU	IX0.4	DI 4	%I3.4
	IX0.5	DI 5	%I3.5
	IX0.6	DI 6	%I3.6
	IX0.7	DI 7	%I3.7
	IX1.0	DI 8	%I4.0
	IX1.1	DI 9	%I4.1
	IX1.2	DI 10	%I4.2
IB1	IX1.3	DI 11	%I4.3
	IX1.4	DI 12	%I4.4
	IX1.5	DI 13	%I4.5
	IX1.6	DI 14	%I4.6
	IX1.7	DI 15	%I4.7

Process data inputs UR20-16DI-P

* logical addresses of this sample project, see device overview

Applied to the logical	addresses of the	PLC the mapping can look like this:
		- 11 5

			9	1 🏥 🔰 🔓 🕫 🕫	A DO 00 1		
		HRT 1601 P	i	Name	Address	Display format	Monitor value
X 1			18 // S	lot 1 - 16CH Digital input n	nodule		
	PWR		19	*xDI_CH0*	%13.0	Bool	TRUE
			20	"xDI_CH1"	%13.1	Bool	FALSE
			21	"xDI_CH2"	%13.2	Bool	FALSE
			22	"xDI_CH3"	%13.3	Bool	FALSE
	= LINK1		23	"xDI_CH4"	%13.4	Bool	FALSE
X 2	ACT1		24	"xDI_CH5"	%13.5	Bool	FALSE
		🦉 📔 🔤	25	*xDI_CH6*	%13.6	Bool	FALSE
x2	= ACT2		26	"xDI_CH7"	%13.7	Bool	FALSE
	6		27	*xDI_CH8*	%14.0	Bool	FALSE
x2 =			28	"xDI_CH9"	%14.1	Bool	FALSE
			29	"xDI_CH10"	%14.2	Bool	FALSE
	2 🚺		30	"xDI_CH11"	%14.3	Bool	FALSE
			31	*xDI_CH12*	%14.4	Bool	FALSE
	Service		32	*xDI_CH13*	%14.5	Bool	FALSE
			33	*xDI_CH14*	%14.6	Bool	FALSE
			34	*xDI_CH15*	%14.7	Bool	FALSE

4 **PROFIsafe basics**

4.1 The physical hardware

This chapter is intended to summarise the most frequently asked questions about the hardware of Profisafe modules.

AUX characteristics for P- or N switching inputs

Depending on the selected parameter the auxiliary voltage at the input channel has different levels:

Module parameter for auxiliary outputs at digital input channels of UR20-xx-PN-FSPS-V2

Channel	Parameter		AUX - Signal
CH 0:	Input delay:	3ms	
[AUX 0]	Test pulse:	internal	
	Input polarity:	N-switching	
CH 1:	Input delay:	3ms	
[AUX 1]	Test pulse:	internal	
CH0/1:	Input dual channel mode:	dual channel equivalent	
			0V [⊥] t
CH 0:	Input delay:	3ms	
[AUX 0]	Test pulse:	from AUX 0	
	Input polarity:	N-switching	
CH 1:	Input delay:	3ms	
[AUX 1]	Test pulse:	from AUX 1	
CH0/1:	Input dual channel mode:	dual channel equivalent	



0\

Input delay (single and dual channel mode)

Every time when a switch is actuated the contacts in the switch are bouncing for a while. For this reason, the input signal is changing several times. To prevent that the logical input signal also toggles this parameter can be used to configure a time that shall be waited before the logical signal changes its logical state to true. The minimum required length of the input delay that must be configured depends on how long it takes before the input signal becomes stable:



Discrepancy time (only in dual channel mode)

After a valid signal change was detected on one of the related channels the module expects a signal change on the other channel within configured discrepancy time. A missing or delayed signal change will cause a discrepancy error:



Signals at digital input channels of UR20-xx-PN-FSPS-V2 in dual channel mode

Equivalent (only in dual channel mode)

Both connected switching elements are the same type (NO+NO or NC+NC), this causes that the signal change on one channel is equivalent to the other channel.

Antivalent (only in dual channel mode)

The connected switching elements are always different types (NO+NC), this causes that the signal change on one channel is antivalent to the other channel.

An error occurred – how to solve it....



The corresponding transition diagram which describes the dependencies between the different states can also be found in the "IP20 modules for functional safety" manual:



To get more familiar with the indicated diagnoses the following example describes the process beginning with powering on the system followed by a discrepancy error:



Power on the PLC and u-remote station The module is waiting for parameters from the safety PLC.

DI X (N) AUX-O X AUX-O Y DI Y (P) $\bigcirc \blacksquare 1$ $\bigcirc \blacksquare 2$ $\square Y = 3$ $\bigcirc \blacksquare 3$ $\bigcirc \square 3$

PLC is in run and data exchange has been started

Valid parameters were received from the safety PLC and no error was detected.

		1		-	3-5		
DI X (N) AUX-0 X AUX-0 Y					7	∼Ð	
				-1 -			
			11	ù.			
DI Y (P)	(O^{-})	-	<u> </u>	5			

Emergency push button operated with a defect switching element

Within the configured discrepancy time a signal change was only detected on one of the two input channels. This causes that the complete module changes to "fault state".

As long as the module is in this state the error cannot be acknowledged from the safety PLC!



Switching element was exchanged – ready to be reintegrated

As soon as a valid signal change has been detected the module is waiting for an acknowledge from the safety PLC.

A global acknowledge can be triggered in the safety program by using the basic function block "ACK_GL":



Global acknowledge was send by PLC

After having received the acknowledge the module changes back to the normal operating mode.

4.2 Installing the PROFIsafe parameter checksum generator

Before PROFIsafe modules can be used in TIA Portal and other engineering tools it is mandatory to install an additional product related tool to be able to calculate the check sum corresponding to the selected module parameters.



For all PROFIsafe modules manufactured by Weidmüller the "CPD-Tool" must be used which can be downloaded from the support center:

	Search Resul	ts		
	cpd tool	×	Q Search	
All Downloads	Product Catalogue	Online Documentation	Video Tutorial	
	afe_parameter-checks FBC-PN-IRT-V2, 2614380	um-generator) Downloads		_Tool_en_V2.zip
Showing 1 item			Items per page: 100) 🕶 < >

- 1) Unzip the downloaded archive "Setup CPD Tool en xx.zip"
- 2) Start the installation with the extracted "setup.exe" and follow the instructions



As soon as the has been finished successful the "CPD-Tool" can be executed from the engineering tool (see chapter 3.3)

4.3 Using the "CPD-Tool" without engineering tool

A shortcut to execute the "CPD-Tool" will also be available in Windows Start menu:



In default configuration an error will occur when the tool is not started within an engineering tool, because the expected data package which contains the selected module parameters from the hardware configuration of the project are missing:



Error: Invalid program arguments received

In case that a device tool cannot be started from the engineering tool it is also possible to execute it from Windows directly by changing the following value in the configuration file:

- Go to C:\ProgramData\Weidmueller\Safety Configurator\ (hidden folder)
- Open WeidmuellerSafetyCRCTool.ini with a text editor
- Change the value for EditModeEnabled=0 to 1:

[COMMON]	
CloseCommitDialog=0	
CrcDisplayFormat=0	
DebugTpf=1	
EditEnabled=1	
]	

Now the module and its parameters have to be select manually before the corresponding checksum can be calculated.

4.4 Using PROFIsafe modules in TIA Portal

Precondition to begin with this chapter is that the u-remote fieldbus coupler is already setup in the hardware configuration (chapter 3.3) and the PROFIsafe parameter checksum generator is installed (chapter 4.2).

1. Add a FSPS module to the hardware configuration

Like all other modules the FSPS modules can be added to the u-remote station in the device view. In this example the UR20-4-DI-4DO-PN-FSPS-V2 module is used:

ect Ungrouped devices UR20-FBC-PN-IRT-V2 [UR2	20-FBC-F	N-IRT-V2 Profinet Device with	i Statu	s Word]	_ 7 -	i×	Hardware cat	alog	7 1	
	21	opology view 🛛 🛔 Network	view	DY D	evice view		Options			
F UR20-FBC-PN-IRT-V2 [UR20-FB] 🧱 🗱 🔚	Devic	e overview								
, St	· **	Module	Rack	Slot	I address		✓ Catalog			
		 UR20-FBC-PN-IRT-V2 	0	0	12	~	<search></search>		iril.	irit
call.Y.		 UR20-FBC-PN-IRT Profine 	0	0 IF			Filter Pro	ofile:		
820		UR20-16DI-P_1	0	1	34	=		0-2DI-P-TS	- Internal	~
<u>»</u> .		UR20-4DI-4DO-PN-FSPS-V2_1	0	2	59		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0-4DI-2W-230V-AC		1
			0	3	1	1		0-4DI-4DO-PN-FSPS		
			0	4	~	-		0-4DI-4DO-PN-FSPS-V2		11
			0	5			UR2			1
			0	6		1	UR2			
			0	7				0-4DI-P-3W		
			0	8				0-4DI-P-TS		
			0	9				D-8DI-ISO-2W		-
			0	10		1		0-8DI-N-3W		
			0	11				D-8DIO-P-3W-DIAG		
			0	12		-		0-8DI-P-2W		
			0	13		-		0-8DI-P-3W		
×			0	14		~		0-8DI-P-3W-HD		
III > 100%	<	ш		2.	>			D-8DI-PN-FSPS		V

2. Set a safety address at the module



On each FSPS module a unique safety address has to be set as a binary value by using the DIP switches on the electronic unit. In this example the safety address **3** shall be configured:

Decimal	value:	2048	1024	512	256	128	64	32	16	8	4	2	_
DIP-	No.	11	10	9	8	7	6	5	4	3	2	1	0
switch	Value	0	0	0	0	0	0	0	0	0	0	1	1

The configured safety address is also displayed in the webserver of the fieldbus coupler below the general parameter information of the module:

🗲 u-remote Webi	nterface × +				~	-	C	1	×
 	192.168.2.231				@ ☆	*		-	:
Weidm	üller 🏵		+ Extras ≁	Firmware	Login		Lang	🗭 uage	•
Overview	Station data 👻	Force +						Help	
	2	Module 2: UR20-4[01-4DO-PN-FSP	S-V2 (Ordering d	ata)				
		Parameter							
	_	- General		_					
<u> </u>	4200	Safety	address	3					
list		+ Channel 0							
Component list	2	+ Channel 1							
di li	a	+ Channel 2							

3.	Configure the safety addresses in the hardware configuration
	Go to the device view and open the PROFIsafe parameters of the module:
	ject 🕨 Ungrouped devices 🔸 UR20-FBC-PN-IRT-V2 [UR20-FBC-PN-IRT-V2 Profinet Device with Status Word] 💦 🗕 🖬 🗮 🗙

		🚰 Topology view 🛛 🛔 Network	k view	D YD	evice view	
UR20-FBC-PN-IRT-V2 [UR20-FB	💽 🗏 🗷 🔏' 🖼 🗍	Device overview				
-BODERS	^	1 Module	Rack	Slot	I address	
URL	=	UR20-FBC-PN-IRT-V2	0	0	12	~
		UR20-FBC-PN-IRT Profine	0	O IF		1
		UR20-16DI-P_1	0	1	34	
		UR20-4DI-4DO-PN-FSPS-V2_1	0	2	59	
			0	3		
			0	4		
			0	5		
			0	6		
			0	7		
	~		0	8		~
; III > 100%	· · · · · · · · · · · · · · · · · · ·	(()			3	
	PROFIsafe					^
General						. ^
General Catalog information PROFIsafe	PROFIsafe	SIL: SIL3		•		•
General Catalog information	PROFIsafe	SIL: SIL3 gth: 3-Byte-CRC		•		
General Catalog information PROFIsafe Module parameters	PROFIsafe	gth: 3-Byte-CRC				
General Catalog information PROFIsafe Module parameters	PROFIsafeF_	gth: 3-Byte-CRC				
General Catalog information PROFIsafe Module parameters	PROFIsafeF_ F_CRC_Leng F_Block	gth: [3-Byte-CRC]D: 1 ion: 1				
General Catalog information PROFIsafe Module parameters	PROFIsafeF_ FCRC_Leng F_Block F_Par_Versi	gth: 3-Byte-CRC 10: 1 1 ion: 1 1			~	
General Catalog information PROFIsafe Module parameters	PROFIsafe F	gth: 3-Byte-CRC [D: 1				
General Catalog information PROFIsafe Module parameters	PROFisafeFFFFFF	gth: 3-Byte-CRC [D: 1		· ·		
General Catalog information PROFIsafe Module parameters	PROFisafeFFFFFF	gh: 3-8yte <cbc JD: 1 dd: 1 dd: 1 dd: 3 €: 0 ✓ Menual assignment of F-monito</cbc 	ring time	· ·		
General Catalog information PROFIsafe Module parameters	PROFIsafeF_ F_CRC_Leny F_Block F_Pac_Versi F_Source_A F_Dest_A F_Par_CRC_WthoutAddress	ght 3-8yte <crc JD: 1 1 dd: 1 dd: 3 3 ces: 0 ✓ Menual assignment of F-monito me: 150 ms</crc 	ring time	· ·		
General Catalog information PROFIsafe Module parameters	PROFIsafeF_ F_CRC_Leny F_Block F_Dest_A F_Dest_A F_Dest_A F_Par_CRC_WithoutAddress F_WD_Tit F_IPar_C	ght 3-8yte <crc JD: 1 1 dd: 1 dd: 3 3 ces: 0 ✓ Menual assignment of F-monito me: 150 ms</crc 	ring time	· ·		F
General Catalog information PROFIsafe Module parameters	PROFIsafeF_ F_CRC_Leny F_Block F_Dest_A F_Dest_A F_Dest_A F_Par_CRC_WithoutAddress F_WD_Tit F_IPar_C	dh: 3-8yterCRC JD: 1 int 1 dd: 1 dd: 3 dd: 3 ✓ Menual assignment of F-monito me: 150 ms :RC: 0		· ·		F
General Catalog information PROFIsafe Module parameters	PROFIsafeF_ F_CRC_Leny F_Block F_Dest_A F_Dest_A F_Dest_A F_Par_CRC_WithoutAddress F_WD_Tit F_IPar_C	dh 3-8jte-CRC JO: 1 1 1 1 1 1 1 1 1 1 1 1 1 1		· ·		F

F_Dest_Add:

The safety address which was set on the electronic unit in step 2 has to be set for the F-destination address.

F_Source_Add:

The "Central F-source address" of the corresponding F-PLC

The valid addresses can be found in the "Failsafe" parameters of the PLC:

MyProfinetProject ▸ Pl	_C_1 [C	PU 1212FC DC/DC	/DC]			5	_ # = ×
			÷	Topology view	h Network	/iew 📑 Devid	e view
PLC_1 [CPU 1212FC]	1	- 🖪 🖭 🍊	Dev	ice overview			
•			<u>^</u>	Module		Slot I address	Q ad
103 102 101		1 2	=			103	^
		auxa-=				102	1
s		2012/02/2012	-			101	=
				▼ PLC 1		1	
			~	HSC_3		1 18 100810	80
100%		· · · · · · · · · · · · · · · · · · ·	. 🗉 🔍				>
PLC_1 [CPU 1212FC DC	/DC/DC	1		Properties	🗓 Info 🚺 🗓	Diagnostics	
General IO tags	Svs	stem constants	Texts				
General		F-activation	Texas				^
Project information		1-acuvation					^
Catalog information Identification & Maint.				F-capability acti	vated		
Checksums	-			Disable F-ac	tivation		
Fail-safe							
PROFINET interface [X1]	-						=
General		F-parameters					100
F-parameters				(
Ethernet addresses	-	r-destination	n address range	for PROFIsafe ad	aress type 1		5 5
Time synchronization		a second s	it for F-destination		_		
Operating mode		Low IIII	addresses:	1	n		
 Advanced options 		High lim	it for F-destination		-	>	
Interface options		Tigh int	addresses:	99			
 Real time settings 							No. No. of
 Real time settings IO communic 							-
		Central	F-source address:	1			
Real time opt Port [X1 P1]			nonitoring time for				
◆ Port [X1 P1] General		Delauit F-n	central F-I/O:	150	ms		
	~			Linnin			F-PL
Port interconne.	· · ·						
111							

4. Choose module parameter

Choose the module and channel related parameter of this module:



5. Calculate the checksum for module parameters

As soon as the module parameters are selected a checksum must be calculated. Click right on the module in the device overview and select "Start device tool...":



Select the "Weidmüller Safety Configurator" and click on "Start":



A CALL REPORT OF THE REPORT							
idmüller 🗹							
endor/Device				-			
Vendor : Weidmueller				ALCONT OF THE OWNER			
				ALL			
Device : UR20-FBC-PN-IRT Profisafe				and the second			
Description : UR20-FBC-PN-IRT-V2			24				
Module : UR20-4DI-4DO-PN-FSPS-V2			1.0	-			
Module : UR20-4DI-4DO-PN-FSPS-V2							
rameter							
Weidmueller	Ch 5: Output test pulse duration						
UR20-FBC-PN-IRT Profisafe	Value		Input				
✓ Bus Address		0,5 ms 0,5 ms	a dente	+			
UR20-4DI-4DO-PN-FSPS-V2		ete me Tresser					
✓ Ch 0: Input delay							
Ch 0: Test pulse							
Ch 0: Input polarity							
✓ Ch 1: Input delay	Overview						
Ch 1: Test pulse	Name	Value	min.	max.	Тур	View	1
✓ Ch 0/1: Input dual channel mode		Value 1 ms	min. 1 ms	max. 100 ms	Typ UInt	View	
Ch 0/1: Input dual channel mode Ch 0/1: Discrepancy time [ms]	Name Ch 0: Input delay Ch 0: Test pulse						ŕ
✓ Ch 0/1: Input dual channel mode ✓ Ch 0/1: Discrepancy time [ms] ✓ Ch 2: Input delay	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity	1 ms	1 ms	100 ms	UInt	enum	
✓ Ch 0/1: Input dual channel mode ✓ Ch 0/1: Discrepancy time [ms] ✓ Ch 2: Input delay ✓ Ch 2: Test pulse	Ch 0: Input delay Ch 0: Test pulse	1 ms internal	1 ms internal	100 ms from AUX1	UInt UInt	enum	
✓ Ch 0/1: Input dual channel mode ✓ Ch 0/1: Discrepancy time [ms] ✓ Ch 2: Input delay ✓ Ch 2: Test pulse ✓ Ch 2: Input polarity	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity	1 ms internal P-switching	1 ms internal P-switching	100 ms from AUX1 N-switching	UInt UInt Bool	enum enum enum	
√ Ch 0/1: Input dual channel mode √ Ch 0/1: Discrepancy time [ms] √ Ch 2: Input delay √ Ch 2: Test pulse √ Ch 2: Test pulse √ Ch 3: Input delay	Ch 0: Input delay Ch 0: Test pulse Ch 0: Test pulse Ch 0: Input delay Ch 1: Test pulse Ch 0/1: Input dual channel mode	1 ms internal P-switching 1 ms	1 ms internal P-switching 1 ms internal	100 ms from AUX1 N-switching 100 ms	UInt UInt Bool UInt	enum enum enum enum	
 √ Ch 0/1: Injut dual channel mode √ Ch 0/1: Discrepancy time [ms] √ Ch 2: Injut delay √ Ch 2: Test pulse √ Ch 2: Injut plaintly √ Ch 3: Injut delay √ Ch 3: Test pulse 	Ch 0: Input delay Ch 0: Test pulse Ch 0: Test pulse Ch 1: Input delay Ch 1: Test pulse Ch 0/1: Input dual channel mode Ch 0/1: Discrepancy time [ms]	1 ms internal P-switching 1 ms internal Dual channel e 500	1 ms internal P-switching 1 ms internal Single channel 5	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000	UInt UInt Bool UInt UInt UInt UInt	enum enum enum enum enum Dec	
 ✓ Ch 0/1: Input dual channel mode ✓ Ch 0/1: Discrepancy time [ms] ✓ Ch 2: Input delay ✓ Ch 2: Test pulse ✓ Ch 2: Input delay ✓ Ch 3: Input delay ✓ Ch 3: Test pulse ✓ Ch 3: Test pulse ✓ Ch 3: Test pulse 	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity Ch 1: Input delay Ch 1: Input delay Ch 0/1: Input dual channel mode Ch 0/1: Discrepancy time [ms] Ch 2: Input delay	1 ms internal P-switching 1 ms internal Dual channel e S00 1 ms	1 ms internal P-switching 1 ms internal Single channel 5 1 ms	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms	UInt UInt Bool UInt UInt UInt UInt UInt UInt	enum enum enum enum enum Dec enum	
 ✓ Ch ()1: Injut dual channel mode ✓ Ch ()1: Discrepancy time [ms] ✓ Ch 2: Injut does ✓ Ch 2: Injut polently ✓ Ch 3: Injut polently ✓ Ch 3: Injut delay ✓ Ch 3: Test pulse ✓ Ch 2;3: Injut dual channel mode ✓ Ch 2;3: Discrepancy time [ms] 	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity Ch 1: Input delay Ch 1: Test pulse Ch 0/1: Input dual channel mode Ch 0/1: Input dual channel mode Ch 0/1: Discrepancy time [ms] Ch 2: Input delay Ch 2: Test pulse	1 ms internal P-switching 1 ms internal Dual channel e S00 1 ms internal	1 ms internal P-switching 1 ms internal Single channel 5 1 ms internal	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt	enum enum enum enum enum Dec enum enum	
 ✓ Ch ()1: Input dual channel mode ✓ Ch ()1: Input delay ✓ Ch 2: Input delay ✓ Ch 2: Test pulse ✓ Ch 2: Input delay ✓ Ch 3: Input delay ✓ Ch 3: Input delay ✓ Ch 3: Test pulse ✓ Ch 2/3: Input delay ✓ Ch 2/3: Input dual channel mode ✓ Ch 2/3: Input dual channel mode ✓ Ch 2/3: Discrepancy time [ms] ✓ Ch 4: Output test pulse 	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity Ch 1: Input delay Ch 1: Test pulse Ch 0/1: Input delay Ch 0/1: Input delay Ch 2: Input delay Ch 2: Test pulse Ch 2: Test pulse	1 ms internal P-switching 1 ms internal Dual channel e S00 1 ms internal P-switching	1 ms internal P-switching 1 ms internal Single channel 5 1 ms internal P-switching	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt Bool	enum enum enum enum enum Dec enum enum enum	
	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity Ch 1: Input delay Ch 1: Est pulse Ch 0/1: Input delay Ch 0/1: Input delay Ch 0/1: Discrepancy time [ms] Ch 2: Input delay Ch 2: Test pulse Ch 2: Input polarity Ch 3: Input delay	1 ms internal P-switching 1 ms internal Dual channel e S00 1 ms internal P-switching 1 ms	1 ms internal P-switching 1 ms internal Single channel 5 1 ms internal P-switching 1 ms	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt Bool UInt	enum enum enum enum enum Dec enum enum enum	
 ✓ Ch ()1: Input dual channel mode ✓ Ch ()1: Input delay ✓ Ch 2: Input delay ✓ Ch 2: Input polarity ✓ Ch 2: Test pulse ✓ Ch 3: Input delay ✓ Ch 3: Input delay ✓ Ch 2: Test pulse ✓ Ch 2: Test pulse ✓ Ch 2: Ibscrepancy time [ms] ✓ Ch 4: Output test pulse duration ✓ Ch 4: Output test pulse 	Ch 0: Input delay Ch 0: Teet pulse Ch 0: Teet pulse Ch 0: Input polarity Ch 1: Teet pulse Ch 0/1: Input dual channel mode Ch 0/1: Input dual channel mode Ch 0: Input delay Ch 2: Teet pulse Ch 2: Teet pulse Ch 3: Input delay Ch 3: Input delay Ch 3: Teet pulse	1 ms internal P-switching 1 ms internal Dual channel e 500 1 ms internal P-switching 1 ms internal	1 ms internal P-switching 1 ms internal Single channel 5 1 ms internal P-switching 1 ms internal	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms from AUX3	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt UInt	enum enum enum enum enum Dec enum enum enum enum	
 ✓ Ch Q1: Input dual channel mode ✓ Ch Q1: Discrepancy Imme [ms] ✓ Ch 2: Input delay ✓ Ch 2: Input polarity ✓ Ch 2: Input polarity ✓ Ch 2: Input polarity ✓ Ch 2: Test pulse ✓ Ch 2/3: Input delay ✓ Ch 2/3: Input dual channel mode ✓ Ch 2/3: Discrepancy time [ms] ✓ Ch 4: Output test pulse 	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity Ch 1: Input delay Ch 1: Input delay Ch 0: Test pulse Ch 0: 1: Input delay Ch 2: Test pulse Ch 2: Input delay Ch 2: Test pulse Ch 2: Input delay Ch 3: Test pulse Ch 3: Test pulse Ch 3: Test pulse	1 ms internal P-switching I ms internal Dual channel e 500 I ms internal P-switching I ms internal Single channel	1 ms internal P-switching 1 ms internal Single channel 5 1 ms internal P-switching 1 ms internal Single channel	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms from AUX3 Dual channel	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt UInt	enum enum enum enum enum Dec enum enum enum enum enum enum	
 ✓ Ch Q1: Input dual channel mode ✓ Ch Q1: Input delay ✓ Ch 2: Input delay ✓ Ch 2: Test pulse ✓ Ch 2: Input delay ✓ Ch 2: Input delay ✓ Ch 2: Input delay ✓ Ch 2: Test pulse ✓ Ch 2: Graph dual channel mode ✓ Ch 2: Discrepancy time [ms] ✓ Ch 4: Output test pulse ✓ Ch 3: Output test pulse 	Ch 0: Input delay Ch 0: Test pulse Ch 0: Test pulse Ch 0: Input polarity Ch 1: Input delay Ch 0/1: Input dual channel mode Ch 0/1: Input dual channel mode Ch 2: Input delay Ch 2: Input polarity Ch 3: Input polarity Ch 3: Input delay Ch 3: Input delay Ch 3: Input dual channel mode Ch 2/3: Input dual channel mode Ch 2/3: Input dual channel mode Ch 2/3: Input dual channel mode	1 ms internal P-switching I ms internal Dual channel e Soo 1 ms internal P-switching 1 ms internal Single channel Soo	1 ms internal P-switching 1 ms internal Single channel 5 1 ms internal P-switching 1 ms internal Single channel 5	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms from AUX3 Dual channel 30000	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt UInt	enum enum enum enum enum Dec enum enum enum enum enum Dec	
 √ Ch ()1: Input dual channel mode √ Ch ()2: Discrepancy Itime [ms] √ Ch 2: Input delay √ Ch 2: Sinput delay √ Ch 4: Output test pulse √ Ch 4: Output test pulse √ Ch 4: Output test pulse √ Ch 3: Output test pulse 7 Ch 4; Si 0 Output test pulse 	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity Ch 1: Input delay Ch 1: Input delay Ch 1: Input delay Ch 0: Isorepany time [ms] Ch 2: Input delay Ch 2: Test pulse Ch 2: Input delay Ch 3: Test pulse Ch 3: Output test channel mode Ch 2/3: Discrepancy time [ms] Ch 4: Output test pulse	1 ms internal P-switching 1 ms internal Dual channel e 500 1 ms internal P-switching 1 ms internal Single channel 500 activated	1 ms internal P-switching 1 ms internal 5 ms internal P-switching 1 ms internal Single channel 5 activated	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms from AUX3 Dual channel 30000 deactivated	UInt UInt Bool UInt UInt UInt UInt UInt UInt Bool UInt UInt UInt UInt UInt	enum enum enum enum enum enum enum enum	
 ✓ Ch Q1: Injut dual channel mode ✓ Ch Q1: Injut delay ✓ Ch 2: Injut delay ✓ Ch 3: Injut delay ✓ Ch 3: Injut delay ✓ Ch 3: Injut dual channel mode ✓ Ch 2: Output test pulse ✓ Ch 4: Output test pulse 	Ch 0: Input delay Ch 0: Input delay Ch 0: Input delay Ch 1: Input delay Ch 1: Test pulse Ch 0: Input delay Ch 1: Discrepancy time [ms] Ch 2: Test pulse Ch 2: Test pulse Ch 2: Test pulse Ch 2: Test pulse Ch 2: Sinput delay Ch 3: Input delay Ch 3: Sinput delay Ch 3: Sinput delay Ch 3: Discrepancy time [ms] Ch 4: Output test pulse Ch 4: Output test pulse	1 ms internal P-switching 1 ms internal Dual channel e 500 1 ms internal P-switching 1 ms internal Single channel 500 activated 0,5 ms	1 ms internal P-switching 1 ms internal 5 internal 7 ms internal 9 ms internal 5 Single channel 5 activated 0,5 ms	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms from AUX3 Dual channel 30000 deactivated 10 ms	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt UInt	enum enum enum enum enum Dec enum enum enum enum Dec enum enum enum	
 √ Ch ()1: Input dual channel mode √ Ch ()2: Discrepancy Itime [ms] √ Ch 2: Input delay √ Ch 2: Sinput delay √ Ch 2: Sinput delay √ Ch 2: Sinput delay √ Ch 2: Output test pulse √ Ch 2: Output test pulse duration √ Ch 2: Output test pulse duration √ Ch 2: Output test pulse duration √ Ch 2: Output test pulse duration ↑ Ch 3: Output test pulse ↑ Ch 4: Output test pulse ↑ Ch 3: Output test pulse ↑ Ch 3: Output test pulse 	Ch 0: Input delay Ch 0: Test pulse Ch 0: Input polarity Ch 1: Input delay Ch 1: Input delay Ch 1: Input delay Ch 0: Isorepany time [ms] Ch 2: Input delay Ch 2: Test pulse Ch 2: Input delay Ch 3: Test pulse Ch 3: Output test channel mode Ch 2/3: Discrepancy time [ms] Ch 4: Output test pulse	1 ms internal P-switching 1 ms internal Dual channel e 500 1 ms internal P-switching 1 ms internal Single channel 500 activated	1 ms internal P-switching 1 ms internal 5 ms internal P-switching 1 ms internal Single channel 5 activated	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms from AUX3 Dual channel 30000 deactivated	UInt UInt Bool UInt UInt UInt UInt UInt UInt Bool UInt UInt UInt UInt UInt	enum enum enum enum enum enum enum enum	
 ✓ Ch Q1: Injut dual channel mode ✓ Ch Q1: Injut delay ✓ Ch 2: Injut delay ✓ Ch 3: Injut delay ✓ Ch 3: Injut delay ✓ Ch 3: Sinjut delay ✓ Ch 2: Sinjut delay ✓ Ch 4: Output test pulse ✓ Ch 4: Output test pulse duration ✓ Ch 4: Output test pulse ✓ Ch 6: Output test pulse 	Ch 0: Input delay Ch 0: Input delay Ch 0: Input delay Ch 1: Input delay Ch 1: Test pulse Ch 0: Input delay Ch 1: Discrepancy time [ms] Ch 2: Test pulse Ch 2: Test pulse Ch 2: Test pulse Ch 2: Test pulse Ch 2: Sinput delay Ch 3: Input delay Ch 3: Sinput delay Ch 3: Sinput delay Ch 3: Discrepancy time [ms] Ch 4: Output test pulse Ch 4: Output test pulse	1 ms internal P-switching 1 ms internal Dual channel e 500 1 ms internal P-switching 1 ms internal Single channel 500 activated 0,5 ms	1 ms internal P-switching 1 ms internal 5 internal 7 ms internal 9 ms internal 5 Single channel 5 activated 0,5 ms	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms from AUX3 Dual channel 30000 deactivated 10 ms	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt UInt	enum enum enum enum enum Dec enum enum enum enum Dec enum enum enum	
	Ch 0: Input delay Ch 0: Input delay Ch 0: Input delay Ch 1: Input delay Ch 1: Test pulse Ch 0: Input delay Ch 1: Discrepancy time [ms] Ch 2: Test pulse Ch 2: Test pulse Ch 2: Test pulse Ch 2: Test pulse Ch 2: Sinput delay Ch 3: Input delay Ch 3: Sinput delay Ch 3: Sinput delay Ch 3: Discrepancy time [ms] Ch 4: Output test pulse Ch 4: Output test pulse	1 ms internal P-switching 1 ms internal Dual channel e 500 1 ms internal P-switching 1 ms internal Single channel 500 activated 0,5 ms	1 ms internal P-switching 1 ms internal 5 internal 7 ms internal 9 ms internal 5 Single channel 5 activated 0,5 ms	100 ms from AUX1 N-switching 100 ms from AUX1 Dual channel 30000 100 ms from AUX3 N-switching 100 ms from AUX3 Dual channel 30000 deactivated 10 ms N-switching	UInt UInt Bool UInt UInt UInt UInt UInt UInt UInt UInt	enum enum enum enum enum Dec enum enum enum enum Dec enum enum enum	

Confirm	each value	for the	module	parameters	bv	clicking	on	"Accent"
00111111	caon value		modulo	parameters	Ny	Unorthing		7.000001.

As soon as all values are confirmed the checksum can be calculated:

Weidmueller	Ch 6/7: Output dual channel mode						
UR20-FBC-PN-IRT Profisafe	Value		Input				
🗸 Bus Address	Single	channel Single channel	2				
UR20-4DI-4DO-PN-FSPS-V2	1						
V Ch 0: Input delay							
✓ Ch 0: Test pulse							
Ch 0: Input polarity							
✓ Ch 1: Input delay	Overview						
✓ Ch 1: Test pulse	Name	Value	min.	max.	Тур	View	
✓ Ch 0/1: Input dual channel mode	Ch 0: Input delay	1 ms	1 ms	100 ms	UInt	enum	
Ch 0/1: Discrepancy time [ms]	Ch 0: Test pulse	internal	internal	from AUX1	UInt	enum	
✓ Ch 2: Input delay	Ch 0: Input polarity	P-switching	P-switching	N-switching	Bool	enum	
✓ Ch 2: Test pulse	Ch 1: Input delay	1 ms	1 ms	100 ms	UInt	enum	
Ch 2: Input polarity	Ch 1: Test pulse	internal	internal	from AUX1	UInt	enum	
V Ch 3: Input delay	Ch 0/1: Input dual channel mode	Dual channel e	Single channel	Dual channel	UInt	enum	
✓ Ch 3: Test pulse	Ch 0/1: Discrepancy time [ms]	500	5	30000	UInt	Dec	
✓ Ch 2/3: Input dual channel mode	Ch 2: Input delay	1 ms	1 ms	100 ms	UInt	enum	
Ch 2/3: Discrepancy time [ms]	Ch 2: Test pulse	internal	internal	from AUX3	UInt	enum	
Ch 4: Output test pulse	Ch 2: Input polarity	P-switching	P-switching	N-switching	Bool	enum	
Ch 4: Output test pulse duration	Ch 3: Input delay	1 ms	1 ms	100 ms	UInt	enum	
Ch 4: Output polarity	Ch 3: Test pulse	internal	internal	from AUX3	UInt	enum	
Ch 5: Output test pulse	Ch 2/3: Input dual channel mode	Single channel	Single channel	Dual channel	UInt	enum	
Ch 5: Output test pulse duration	Ch 2/3: Discrepancy time [ms]	500	5	30000	UInt	Dec	
Ch 4/5: Output dual channel mode	Ch 4: Output test pulse	activated	activated	deactivated	UInt	enum	
Ch 6: Output test pulse	Ch 4: Output test pulse duration	0,5 ms	0,5 ms	10 ms	UInt	enum	
Ch 6: Output test pulse duration	Ch 4: Output polarity	P-switching	P-switching	N-switching	Bool	enum	
Ch 6: Output polarity							
Ch 7: Output test pulse							
Ch 7: Output test pulse duration Ch 6/7: Output dual channel mode	Accept	Calc-CRC	CRC modul	e			Exit

Copy the displayed checksum (in hex) and close the checksum generator.

Open the PROFIsafe parameters of the module and enter the checksum to individual device parameter checksum "F_iPAR_CRC":

			Topology view	A Network	c view	D YD	evice viev	v
UR20-FBC-PN-IRT-V2 [UR20-FE	I III III III IIII	📑 🗍 De	vice overview					
			Module		Rack	Slot	I address	
			▼ UR20-FBC-PN	I-IRT-V2	0	0	12	^
		-	UR20-FBC	C-PN-IRT Profine	0	O IF		篇
-		1	UR20-16DI-P	_1	0	1	34	
-		1	UR20-4DI-4D	O-PN-FSPS-V2_1	0	2	59	
					0	3		
					0	4		
		_			0	5		
		~			0	6		~
IR20-4DI-4DO-PN-FSPS-V2_1 General IO tags S General	VR20-4DI-4DO-PN- ystem constants	North Contraction of the	Q Properties	III	😧 Diag	nostics		>
JR20-4DI-4DO-PN-FSPS-V2_1 General IO tags S	UR20-4DI 4DO-PN- ystem constants	FSPS-V2] Texts F_Par_Version F_Source_Add F_Dest_Add	Properties		况 Diag	nostics		
IR20-4DI-4D0-PN-FSPS-V2_1 General IO tags S General Catalog information PROFIsafe	UR20-4DI 4DO-PN- ystem constants	FSPS-V2] Texts F_Par_Version F_Source_Add	Properties		Diag	nostics		
General 10 tags S General 10 tags S General Catalog information PROFisafe Module parameters	UR20-4DI 4DO-PN- ystem constants	FSPS-V2] Texts F_Par_Version F_Source_Add F_Dest_Add	Properties	1 Info 1		nostics		
General 10 tags S General 10 tags S General Catalog information PROFisafe Module parameters	UR20-4DI 4DO-PN- ystem constants	FSPS-V2] Texts F_Par_Version F_Source_Add F_Dest_Add	Properties I I I S O Manual assignm	1 Info 1				•
General 10 tags S General 10 tags S General Catalog information PROFisafe Module parameters	UR20-4DI 4DO-PN- ystem constants	FSPS-V2] Texts F_Par_Version: F_Source_Add: F_Dest_Add: ithoutAddresses	Properties I I I S Manual assignm 150	t Info 1		CRG		
General 10 tags S General 10 tags S General Catalog information PROFisafe Module parameters	UR20-4DI 4DO-PN- ystem constants	FSPS-V2] Texts F_Par_Version. F_Source_Add: F_Dest_Add: fthoutAddresses: F_WD_Time:	Properties	t Info 1		CRG	c module	•
General 10 tags S General 10 tags S General Catalog information PROFisafe Module parameters	UR20-4DI 4DO-PN- ystem constants	FSPS-V2 Texts F_Par_Version F_Source_Add F_Dest_Add ithoutAddresses F_WD_Time F_iPar_CRC	Properties	tinfo ()		CRG	c module	
IR20-4DI-4DO-PN-FSP5-V2_1 General IO tags S General Catalog information PROFisafe Module parameters	[UR20-4DI-4DO-PN-] ystem constants F_Par_CRC_W	FSPS-V2 Texts F_Par_Version F_Source_Add F_Dest_Add ithoutAddresses F_WD_Time F_iPar_CRC	Properties Properties I I I I I I I I I I I I I I I I I I	tinfo ()	ing time	CRG	c module	

Now the hardware configuration has been finished and can be downloaded to the PLC.

Watch and force tables

Before live values of PROFIsafe modules are displayed in "Watch and force tables" it is mandatory to use minimum one I/O address of the module in the safety program. Otherwise, the process data will not be exchanged and the input values are always 0x00.