Training Document for Comprehensive Automation Solutions

Totally Integrated Automation (TIA)

MODULE D14

PROFIsafe with

Master CPU 315F-2 PN/DP and DP Slave ET 200S

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The following symbols are used as a guide through Module D14:



1. PREFACE

In terms of its contents, Module D14 is part of the teaching unit entitled **'Industrial Fieldbus Systems'**.



Learning Objective:

In Module D14, the reader learns how to start up a safety-oriented application on the PROFIBUS (PROFIsafe). In our case, the CPU 315F-2 PN/DP is used on the PROFIBUS as the master with an ET 200S as slave to monitor the guard door at a press. Emergency Stop is also implemented with the ET200S. Module D14 shows the method in principle, using a brief example.

Prerequisites:

To successfully work through Module D14, the following knowledge is assumed:

- Knowledge in handling Windows
- Fundamentals of PLC programming with STEP 7 (for example, Module A3 'Startup' PLC Programming with STEP 7)
- Fundamentals of PROFIBUS DP (for example, Appendix IV Basics of Fieldbus Systems with SIMATIC S7-300)

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Hardware and software required

- 1 PC, operating system Windows 2000 Professional starting with SP4/XP Professional starting with SP1/Server 2003 with 600MHz and 512RAM, free hard disk storage 650 to 900 MB, MS Internet Explorer 6.0
- 2 Software STEP7 V 5.4
- 3 Software S7 Distributed Safety V5.4
- 4 MPI/PROFIBUS interface for the PC (for example, adapter USB)
- 4 PLC SIMATIC S7-300 with CPU 315F-2 PN/DP
 - Sample configuration:
 - Power supply: PS 307 2A
 - CPU: CPU 315F-2 PN/DP
- **6** Distributed periphery ET 200S for PROFIsafe with digital inputs and outputs Sample Configuration:
 - Interface module IM151-1 HF
 - Power module PM-E DC 24V
 - Digital input module 2DI DC 24V for connecting a button and a switch
 - Digital input module 2DI DC 24V for connecting the feedback circuit of a consumer
 - Digital output module 4DO DC 24V/0.5A for connecting two lamps
 - Power module PM-E DC 24V...48V/AC24V...230V

- Fault-tolerant digital input module 4/8 F-DI DC 24V for connecting a two-channel Emergency Off and two guard door contacts

- Fault-tolerant digital output module 4 F-DO DC 24V/2A for connecting a consumer to two contactors K1 and K2 that can be switched off fail-safe separately.

- Here, the consumer is the supply voltage for a press.
- 7 PROFIBUS connection between IE/PB link and ET200S
- 8 Emergency Off button with 2-channel wiring at the F-DI module of the ET200S
- 9 Press with guard door; scan of guard door by means of two contacts wired to the F-DI module
- 10 Connection lines to the model press and to the emergency off button

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Wiring Diagram



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2. NOTES ON USING THE CPU 315F-2 PN/DP

The CPU 315F-2 PN/DP is a CPU that is shipped with 2 integrated interfaces.

- The first interface is a combined MPI/PROFIBUS-DP interface that can be used on the PROFIBUS DP as master or slave for connecting distributed periphery/field devices with very fast response timing.
 - Moreover, the CPU can be programmed here by means of MPI or PROFIBUS DP.
- The second interface is an integrated PROFINET interface.
 It allows for using the CPU as a PROFINET IO controller to run distributed periphery on the PROFINET. The CPU can be programmed by means of this interface also!
- On both interfaces, fault-tolerant IO devices with *PROFI*safe profile can be used.
- 1-bus concept, transmission with F-signals and standard signals by means of a bus medium (PROFIBUS DP or PROFINET)
- Fault-tolerant IO modules of the ET 200M/S/eco can be connected in the distributed mode.
- Mixed configuration of F-modules and standard modules in one station
- Field devices made by other manufacturers can be connected.
- Standard modules for non-safety related applications can be operated centrally as well as in the distributed mode
- Meets safety requirements up to SIL 3 according to IEC 61508, AK 6 according to DIN V 19250 and Kat. 4 according to EN 954-1
- Standard as well as safety-relevant tasks can be solved with only one CPU

The CPU 315F is based on a standard CPU (F means fault-tolerant here) whose operating system was augmented with different protection mechanisms to make processing safety-oriented user programs possible.

This is needed for configuring a fault-tolerant automation system in plants with heightened safety requirements. The area of application is primarily production engineering. The distributed IO devices ET 200S PROFIsafe with fault-tolerant IO modules can be connected to integrated PROFIBUS DP/PROFINET interfaces as well as to external PROFIBUS/PROFINET CPs. Safety oriented communication takes place by means of PROFIBUS DP /PROFINET with a *PROFI*safe profile.



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Safety Concept

The safety functions of the CPU 315F are included in the F-program and in the fault-tolerant signal modules. The fault-tolerant modules can be used in the distributed IO systems ET200M and ET200S.

The fault-tolerant signal modules monitor output and input signals by means of discrepancy analyses and test signal injections.

The CPU checks the correct operation of the controller through periodic self tests, command tests as well as logical and time-related program run checks. In addition, the IO is checked by requesting life signs.

If an error in the system is diagnosed, the system is brought to a safe state. No F-runtime license is required to operate the CPU 315F.

In addition to the fault-tolerant modules, standard modules can be used.

This makes it possible to set up a fully integrated control system for a plant where, in addition to safety-oriented applications, standard applications also exist.

The entire system is configured and programmed with the same standard tools.

Programming

The CPU 315F is programmed like other SIMATIC S7 systems. The user program for non-fault tolerant parts of the plant is created with the proven STEP 7 programming tools. To program the safety-oriented programs, the software package "S7 Distributed Safety V5.4" is essential. It includes all elements that you need for the engineering process.

The CPU 315F is programmed with the STEP 7 languages F-LAD and F-FBD. Here, the following safety functions can be implemented, for example:

- User programmable safe combination of sensors and actuators
- Selective safe disconnection of actuators

The functional scope regarding operations and data types is restricted. Through a special input during compilation, a safety-oriented, password protected program is generated. In addition to the fault-tolerant program, a standard program can run on the CPU at the same time (coexistence) that is not subject to restrictions.

The F-library with prepared programming examples -approved by the German Technical Inspectorate- for safety-oriented functions is also part of this software package. The user can change these program examples, but these changes have to be recertified.

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Option Package S7 Distributed Safety

The package includes all required functions and blocks for generating the F-program. For **"S7 Distributed Safety V5.4**" to run, **STEP 7** starting with **V5.3+SP3** has to be on the PG/PC. The F-program with the safety functions is wired in F-FBD or F-LAD, or with special function blocks from the F-library. Using F-FBD or F-LAD simplifies configuring and programming the plant and, because of the system-overreaching uniform representation, it also simplifies certification. The programmer can concentrate completely on configuring the safety-oriented application without having to use additional tools.

Notes:

- In Module D14, the CPU 315F-2 PN/DP is used on the PROFIBUS as master.
- F-modules as well as standard modules are integrated.
- A micro-memory card is needed for running this CPU!
- The addresses for the input and output modules can be programmed at this CPU.

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NOTES ON USING THE ET200S WITH IM 151-1 HF 3.



The SIMATIC ET 200S is a decentral IO device configured in a highly modular mode. It can be operated with different interface modules:

IM 151-1 BASIC, IM 151-1 STANDARD and IM 151-1 FO STANDARD for connecting a maximum of 63 IO modules (all types except PROFIsafe) to the PROFIBUS DP; alternatively, bus connection with RS 485 Sub-D connector or by means of integrated fiber-optic connection

IM 151-1 HIGH FEATURE for connecting a maximum of 63 IO modules (all types, including clocked mode for PROFIsafe) to PROFIBUS-DP; bus connection with RS485 Sub-D connector

IM 151-3 PN for connecting a maximum of 63 IO modules (all types, including the clocked mode for PROFIsafe) to PROFINET IO controllers; bus connection by means of RJ45 connector

IM 151-7/F-CPU, IM 151-7/CPU or IM 151-7/CPU FO for connecting a maximum of 63 IO modules (all types; PROFIsafe only with IM151-7/F CPU) to PROFIBUS DP; alternatively bus connection with RS 485 Sub-D connector or by means of an integrated fiber-optic connection; with integrated CPU 314 of the SIMATIC S7-300, for preprocessing process data.

The following IO modules can be used:

Power modules for individual grouping of load and encoder supply voltages and their monitoring Digital electronic modules for connecting digital sensors and actuators

Analog electronic modules for connecting analog sensors and actuators

Sensor module for connecting IQ sense sensors

Technology modules Electronic modules with integrated technological functions, such as counting, positioning, data exchange, etc.

Frequency converters and motor starter modules

For training purposes, an integrated system is available with which many technologies can be taught.

Notes:

- In Module D16, the interface module IM151-1 HF (HIGH FEATURE) is used as PROFIBUS DP slave.
- F-modules as well as standard modules are inserted.
- The PROFIBUS address is set, binary-coded, at 8 switches at interface module IM151-HF. The lowest switch has to be on OFF. A number is assigned to each of the other switches. These numbers add up to the PROFIBUS station address. If the PROFIBUS address is changed, the new setting will be accepted after voltage returns. Therefore, the interface module IM151-1 HF has to be switched off, and then switched on again.

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4. STARTING UP PROFISAFE WITH CPU 315F-2 PN/DP AND ET 200S



Below, the startup the PROFIsafe application is shown. The CPU 315F-2 PN/DP is used on the PROFIBUS as master, with an ET 200S as slave, to monitor the guard door at a press. Emergency Stop is also implemented with the ET200S.



1. The central tool in STEP7 is the 'SIMATIC Manager'. It is called here with a double click. (\rightarrow SIMATIC Manager)



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2. STEP7 programs are managed in projects. We are now setting up such a project (\rightarrow File \rightarrow New)

SIMATIC Manager		
atei Zielsystem Ansicht Extras Fenster Hilfe		
Neu	Ctrl+N	
Assistent 'Neues Projekt'		
Öffnen	Ctrl+O	
S7-Memory Card	•	
Memory Card-Datei	•	
Löschen		
Reorganisieren		
Verwalten		
Archivieren		
Dearchivieren		
Seite einrichten,		
1 Erreichbare Teilnehmer PROFIBUS		
2 PROFIsafe02 (Projekt) F:\0_S7_Projekte\PROFIs_2		
Beenden	Alt+F4	
stellt ein neues. Projekt oder eine neue Bibliothek.		

3. The project is now assigned the name 'Name' 'CPU315F_PROFIsafe'. (\rightarrow CPU315F_PROFIsafe \rightarrow OK)

Name Ablageprad	
 In aktuelles Multiprojekt einfügen Vame: 	Тур:
In aktuelles Multiprojekt einfügen Name: CPU315F_PROFIsafe	Typ:
In aktuelles Multiprojekt einfügen Name: CPU315F_PROFIsafe Ablageort (Pfad) :	Typ: Projekt

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4. Highlight your project and insert a '**PROFIBUS Subnet**'. (\rightarrow CPU315F_PROFIsafe \rightarrow Insert \rightarrow Subnet \rightarrow PROFIBUS)

SIMATIC Manager	- [CPU315F_PROFIs	afe F:\0_\$7_Projekte\CPU315F_]	
Datei Bearbeiten	Einfügen Zielsystem	Ansicht Extras Fenster Hilfe	X
	Subpetz	L D. MDT Kost Rest Rest Rest Rest Rest Rest Rest Re	- <u>7</u> 20 5
CPU315F_PRO	Programm	2 PROFIBUS	
	57-Software 57-Baustein M7-Software	3 Industrial Ethernet 4 PTP	
	Symboltabelle Textbibliothek Externe Quelle	•	
	WinCC flexible RT	E Contraction of the second se	
		_	

5. After you have highlighted your station again, a 'SIMATIC 300 Station' is inserted. (\rightarrow CPU315F_PROFIsafe \rightarrow Insert \rightarrow Station \rightarrow SIMATIC 300 Station)

Datei Bearbeiten	Einfügen Zielsystem	Ansicht Extras Fenster Hilfe	
	Einfugen Zielsystem Subnetz • Programm • 57-Software • 57-Baustein • M7-Software • Symboltabelle • Textbibliothek • Externe Quelle •	Ansicht Extras Penster Hilfe 1 SIMATIC 400-Station 2 SIMATIC 300-Station 3 SIMATIC H-Station 4 SIMATIC PC-Station 5 SIMATIC HMI-Station 6 Andere Station 7 SIMATIC S5 8 PG/PC	ein Filter >

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6. With a double click, open the c	onfiguration tool for the	'Hardware' . (\rightarrow Hardware)
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7. Clicking on the symbol $\frac{1}{100}$, opens the hardware catalog. (\rightarrow

There, arranged in the following directories:

- **PROFIBUS-DP** • **PROFIBUS-PA** •
- **PROFINET IO** •
- SIMATIC 300
- SIMATIC 400, •
- SIMATIC PC Based Control
- SIMATIC PC Station

all racks, modules and interface modules are provided for configuring your hardware. With a double click, insert 'Rail'. (\rightarrow SIMATIC 300 \rightarrow RACK-300 \rightarrow Rail)

🔣 HW Konfig - [SIMATIC 300(1) (Konfiguration) CPU315F_PROFIsafe]	<u>_ ×</u>
💵 Station Bearbeiten Einfügen Zielsystem Ansicht Extras Fenster Hilfe	×
	Suchen: Mt AL
	Profil: Standard
SIMATIC 300(1) Steckplatz Bezeichnung	SIMATIC 300 C7 C7 C9.300 FM-300 SIMATIC 400 SIMATIC 400 SIMATIC HMI Station SIMATIC HMI Station
	6ES7 390-1???0-0AA0 In verschiedenen Längen lieferbar
Drücken Sie F1, um Hilfe zu erhalten.	Änd //

Then, the configuration table for configuring Rack 0 is displayed automatically.



8. From the hardware catalog, you can now select all modules that are also in your real rack, and insert them in the configuration table.

To this end, click on the name of the respective module, hold the mouse key and drag the module to a line in the configuration table.

We are starting with the power unit '**PS 307 2A**'. (\rightarrow SIMATIC 300 \rightarrow PS-300 \rightarrow PS 307 2A)

HW Konfig -	[SIMATIC 300(1) (Ko arbeiten Einfügen Zie	nfiguration) CPU315F_PRO Isystem Ansicht Extras Fenst	FIsafe] er Hilfe		-			<u></u> 문 ×
		1 🛍 🛍 🗈 🔡	▶?					
No. of Concession, Name							-	
	25 307 🗖							Suchen: Mt Mi
2								Profil: Standard
5 6 7 -								
< ▲ → (0)	UR							
Charlen	Devenuese	Destelleummer	l c		l c		1 1	🖬 🚊 SM-300 📃
1		EES7 207.18A00.0AA0	FL	IVI	C	A	N	
$\frac{\frac{1}{2}}{\frac{3}{4}}$	1 1 3 30r 2A							6ES7 307-1BA00-04A0 Laststromversorgung 120/230V AC:24VDC/2A
Einfügen möglich								Änd



Note: If your hardware differs from the one displayed here, simply select the corresponding modules from the catalog and insert them in your rack. The order numbers of the individual modules -that are also indicated on the components- are displayed in the footer of the catalog.

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9. Next, we drag the '**CPU 315F-2 PN/DP**' to the second slot. The order number and the version of the CPU can be read off the front of the CPU. (\rightarrow SIMATIC 300 \rightarrow CPU-300 \rightarrow CPU 315F-2 PN/DP \rightarrow 6ES7 315-2FH10-0AB0 \rightarrow V2.3)

HW Konfig - [SIMATIC 300(1) (Konfiguration) CPU315F_PROFIsafe]	×
	×I Mi
3 4 5 5 6 7 CPU 300 0 0 CPU 300 0 0 CPU 300 0 0 0 CPU 300 0	
Steckplatz Baugruppe Bestellnummer Fi M E A Kommen 1 IPS 307 2A 6ES7 307-1BA00-0AA0 Image: CPU 315-2 PN/DP Image: CPU 315-2 PN/DP <t< td=""><td>▼</td></t<>	▼

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10. When entering the CPU, the following window appears. By clicking on '**New**', you can set up an '**Ethernet**' network.

For correct networking, you have to assign an '**IP** Address' to the CPU 315F-2 PN/DP and specify the '**Subnet Screen Form**'. As an option, a '**Router Address**' can be selected for networkoverreaching communication. Confirm your inputs with '**OK**' (\rightarrow New \rightarrow IP Address: 192.168.1.10 \rightarrow Subnet Screen Form: 255.255.255.0 \rightarrow Ethernet(1) \rightarrow Use Router \rightarrow Address: 192.168.1.1 \rightarrow OK)

llgemein	Parameter	r	< P1910 (R0/32.2)	
			Bei Anwahl eines Subnetzes werden die nächsten freien Adressen vorgeschlager	n
IP-Adresse: Subnetzmasl	(e: 2	192.168.1.10 255.255.255.0	Netzübergang C Keinen Router verwenden Router verwenden Adresse: 192.168.1.1	
Subnetz: nicht ve	ernetzt		Neu	1
Subnetz: nicht ve Ethernet(1)	ernetzt		Neu Eigenschafte	en



Note: To process this module, parameter assignment on the Ethernet is not necessary since subsequently, the CPU is accessed by means of a MPI or PROFIBUS.

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11. Now, the 'MPI/DP' interface has to be switched to PROFIBUS DP. To this end, double click on the line '**MPI/DP**' in the hardware configuration. \rightarrow MPI/DP)

HW Konfig Station Be	- [SIMATIC 300(1) (Konfig arbeiten Einfügen Zielsyste	uration) CPU315F_PROFI em Ansicht Extras Fenster	safe] Hilfe								×
D 😂 🔓 🖥		🛍 🋍 🚯 🗖 🔡 📐	?								
	1							• =			
	PS 307 24							S	<u>u</u> chen:		mt mi
2	CPU 315F-2 PN/DP							P	rofil:	Standard	•
	PW-IO	<u>00)</u>					×			CPU-300 CPU 312 CPU 312 IFM CPU 312 IFM CPU 313 CPU 313C CPU 313C CPU 313C2 DP CPU 313C2 DP CPU 313C2 DP CPU 314C2 DP CPU 314LFM CPU 314C2 DP CPU 314C2 PP CPU 3152 DP	×
	UR		1							E CPU 315-2 PN/DF CPU 3155-2 DP	>
Steckplatz	Baugruppe	Bestellnummer	Fi	M	E /	A	Kommen				P
1	PS 307 2A	6ES7 307-1BA00-0AA0					-			6ES7 315-2EH	10.0480
2	CPU 315F-2 PN/DP	6ES7 315-2FH10-0AB0	V2.3	2							-1
X1	NFI/DF		<u> </u>	2	2047					W V2.3	Ľ
<u>X2</u>	FN-10				2046						
<u>3</u> <u>4</u> <u>5</u>							-	6 A P S	ES7 31 rbeitssp ROFIN 7-Komr	5-2FH10-0AB0 beicher 128KB; 0,1ms/kA\ ET Anschluss; nunikation (ladbare FBs/FI	w; <u>111</u> Cs); ,
ı Drücken Sie E1. u	ım Hilfe zu erhalten.							D			Änd

12. Now, select '**PROFIBUS**' as '**Type**' of interface, and then click on '**Properties**' to set the parameters. (\rightarrow PROFIBUS \rightarrow Properties)

Allgemein Adresse	n Betriebsart K	Konfiguration UI	hr	
Kurzbezeichnung:	MPI/DP			 *
Bestell-Nr:	MELOP			<u>*</u>
Name.	JME17DE			
Tup:	PROFIRING	T		
Adresse:	2			
Vernetzt:	Nein	Eigenschaften.		
Kommentar:				
				*
				-

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13. The window below appears. In the window, assign a '**PROFIBUS Address**' to the CPU 315F-2 PN/DP and select the '**PROFIBUS**' net that has already been generated. If you want to change the parameters of the PROFIBUS network, highlight it and then click on '**Properties**'. Confirm your inputs twice with '**OK**'. (\rightarrow PROFIBUS Address: 2 \rightarrow PROFIBUS(1) \rightarrow Properties \rightarrow OK \rightarrow OK)

Adresse:	
Höchste Adresse: 126 Übertragungsgeschwindigkeit: 1.5 Mbit/s	
subnetz: nicht vernetzt PRDFIRUS(1) 1.5 Mbit/s	Neu
	Eigenschaften
	Löschen

14. Double clicking on 'CPU 315F-2 PN/DP' opens its property catalog. (\rightarrow CPU 315F-2 PN/DP)



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- 15. Under the tab 'Protection', do the following for setting the 'Protection Level':
- Below the option button '1: Access protection for F-CPU', select the option 'Can be canceled with password'
- Activate the option button '2: Write protection'
- Below the option button '3: Write/read protection', enter a password consisting of 8 characters maximum for the F-CPU; for example, "pw_fcpu". Repeat your input in the field 'Repeat input'.
- Activate the option box 'CPU contains Safety Program'.

 $(\rightarrow$ Can be canceled with password \rightarrow Write protection \rightarrow pw_fcpu \rightarrow pw_fcpu \rightarrow CPU contains safety program)

Schutzstufe	Betrieb Proze zuläss durch Testt	&betrieb ige Zyklusze Testfunktior xetrieb	eiterhöhung nen: [5 ms
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- 16 Under the tab 'Cycle/Clock flag', perform the following settings:
- At "OB85-call if there is an IO access error", select "Only for first up and cleared errors'.
- Activate the option box 'Clock Flag' and enter the '0' as flag byte.
- $(\rightarrow$ Cycle/Clock Byte \rightarrow Only for first up and cleared errors \rightarrow 0)

Weckalarme Allgemein Anla	Diagnose / Uhr uf Zyklus / Ta	Schut: aktmerker	z Komm Remanenz	unikation Alarme	F-Parameter Uhrzeitalarme
Zyklus					
🔽 OB1-Prozeßabb	oild zyklisch aktualisi	ieren			
Zyklusüberwachun	gszeit (ms):	150	_		
Mindestzykluszeit (r	ms]:	0	_		
Zyklusbelastung du	urch Kommunikation	[%]: 20	-		
Größe des Prozeßa	bbilds		*		
0885-Aufruf bei Pe	ripheriezugriffsfehler	n Nur be	i kommenden u	nd gehenden Fe	ehlern 🔽
0885-Aufruf bei Pe	ripheriezugriffsfehler	r: Nur be	i kommenden u	nd gehenden Fe	shlern
0885-Aufruf bei Pe Taktmerker	ripheriezugriffsfehler	n <mark>Nurbe</mark>	i kommenden u	nd gehenden Fe	ehlern
0885-Aufruf bei Pe Taktmerker I Taktmerker	ripheriezugriffsfehler	: Nurbe	ii kommenden u	nd gehenden Fe	shlern
0885-Aufruf bei Pe Taktmerker ✓ Taktmerker Merkerbyte:	ripheriezugriffsfehler	r: Nur be	ii kommenden u	nd gehenden Fe	ehlern 🔽
0B85-Aufruf bei Pe Taktmerker I Taktmerker Merkerbyte:	ripheriezugriffsfehler	r: Nur be	i kommenden u	nd gehenden Fe	ehlem

17. Change to the tab '**Time Interrupts**' and set the call time for the time interrupt OB35. (In the time interrupt OBs, the safety program is called at fixed time intervals.) (\rightarrow Time Interrupt \rightarrow OB35 \rightarrow 50)

Weck	/eckalarme Diagnose / Ul		agnose / Uhr Schutz Kommunikation		
	Priorität	Ausführung	Phasenverschiebung	Einheit	Teilprozeßabbild
OB30:	0	5000	0	ms 💌	_
OB31:	0	2000	0	ms 💌	_
OB32:	0	1000	0	ms 💌	_
OB33:	0	500	0	ms 💌	_
OB34:	0	200	0	ms 💌	_
OB35:	12	50	0	ms 💌	7
0836:	0	50	0	ms 💌	_
OB37:	0	20	0	ms 💌	_
0838	0	10	0	ms 🔻	-

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- 18. Go to the tab 'F-Parameters' and set the following parameters:
- The basis for the PROFIsafe addresses
- A number band for F-data blocks
- A number band for F-function blocks
- The local data amount used by the F-system

Confirm with 'OK'. (\rightarrow F-Parameters \rightarrow OK)

Eren PROFIsafe □ □ □ □ Basis für PROFIsafe-Adressen □ 2	
	2000
- E von (DB)	600
Li bis (DB)	1000
🛱 🤤 F-Funktionsbausteine	
-🔳 von (FB) 🛛 🗧	500
LE bis (FB)	000
E-S F-Lokaldaten	202
LEI Grobe	192



Note: When the safety program is generated, F-blocks are added automatically, in order to generate a runnable safety program. For these automatically added F-blocks, a number band has to be reserved here.

19. Now, close the message window for the required 'New generation of the safety program'. (\rightarrow Close \rightarrow OK)

genschaften - CPU 315F-2 PN/DP - (R0/52)	
Objekteinenschaften	1 i 1 i i i i i i i i i i i i i i i i i
Liste der Meldungen:	
Achtung, Sie haben eine sicherheitsrelevante Projektierung geande	ert, wenn sie die Anderung ub
	Þ
Objekteigenschaften (997:1032)	Hilfetext
Achtung. Sie haben eine sicherheitsrelevante Projektierung geändert, wenn sie die Änderung übernehmen ist eine Neugenerierung des	Gehe zu
Schließen Speichern	Hilfe

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20. After you have accepted the network settings and the parameters for the 'CPU 315F-2 PN/DP', to the right of the CPU315F-2 a bar appears -the 'DP Master System'- where you can arrange the PROFIBUS slaves. To do this, click on the desired module (here the 'ET 200S' with 'IM151-1 HF') in the hardware catalog in the path 'PROFIBUS-DP' and drag the module to the 'DP Master System'. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF)

HW Konfig - [SIM	1ATIC 300(1) (Kor	figuration) CPU315F_PROF	Isafe]									
UN Station Bearbeit	en Einfügen Ziels	ystem Ansicht Extras Fenste	er Hilfe								_	. 8 ×
	1 6 B R	🔬 🏜 🚯 🗖 🔡 🛛	N?									
⊐ (0) UB		1						-				⊐∎×
1 D PS 307	7.26	3							S <u>u</u> chen:			nt mi
2 CPU 3	315F-2 PN/DP	PROFIBUS(1): DP-Ma	stersyst	tem (1)		•1		Profil:	Standard		-
XI MIPI/D X2 PN-10									₽₩ P	ROFIBUS-DP		•
3		-								bereits projektie CiR-Objekt	rte Stationer	Į.
Ethernet(1): F	PROFINET-IO-System	 h (100)							±	DP V0-Slaves		
									±	DP/AS-1 DP/PA-Link		
									÷.	ENCODER		
									±	ET 2006		
									±	ET 200eco		
									±	ET 200iSP		
									÷	ET 200L		
4									±.	ET 200pro		
										ET 200R		
		4	-				1		H	📑 🖬 IM151-1 Ba	isic	
Steckplatz	Baugruppe	Bestellnummer	Fi	M	E	A	Kommentar		+	- M151-1 FU	Standard	
	'S 307 2A	6ES7 307-18A00-0AA0	1/2.2					-		- M151-1 FC	Standard	
	JPU STJE-Z EN7U VPU/DP	P 0E37 313-2FHT0-0480	¥2.3		3047		3	10		- 🖌 IM151-1 HP	1	. .
	5N-1/7		0.00		2041		2	18				
3			0 - S				e		6ES7 151	-1BA00-0AB0		- E.
4									Interfacer	nodul IM151-1 für module, Sendefäl	ET 2005	
			-			-		-	direkten D	latenaustausch, i	interstützt	-
, Drücken Sie E1, um Hilf	e zu erhalten.									[Änd

21. When entering the slave, the window below appears. In it, you have to assign a PROFIBUS address to the slave. It has to be identical with the one that you set at the switches of the ET 200S. (\rightarrow 3 \rightarrow OK)

Adresse:	3 -			
Obertragungsges Subnata:	schwindigkeit: 1.5 Ml	bit/s		
nicht vernel	tzt	1.5 Mbit/s	Neu	
-HOHDO3(1)		(1.5.MDR/S)	Eigenschaften	
			Löschen	

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22. By double clicking on 'IM151-1 HF', its property catalog is opened. (\rightarrow IM151-1 HF)

HW Konfig - [SIMATIC 300(1) (Konfigur Station Bearbeiten Einfügen Zielsystem	ation) CPU315F_PRC Ansicht Extras Fens)FIsafe] ter Hilfe				
	à 🛍 🚯 🗖 🔡	₩?				
00 UR 1 PS 307 2A CPU 315F-2 PN/DP X7 MPl/DP	PROFIBUS	:(1): DP-Masters	ystem (1)		Suchen: Erofil: Standard	- IX nt mi
Ethemet(1): PROFINET-IO-System (100)		(3) IM151-1			PROFIBUS-DP Profibus-DP Dereits projektierte Stationen DF/AS-i DP/AS-i DP/AA-Link DP/CDER DF/CDER DF/CDER DF/CDER DF/CDER DF/CDER DF/CDER DF/CDER	
(3) IM151-1 HF			Adressen	▶ packen	ET 200eco ET 200is ET 200is ET 200is ET 200is ET 200is ET 200is ET 200L ET 200L	
Steckplatz Baugruppe	Bestellnummer	E A	D	Komm	ET 200pro	<u>ل</u>
					6ES7151-1BA00-0AB0 Interfacemodul IM151-1 für ET 2005 Elektronikmodule, Sendefähigkeit für direkten Datenaustausch, unterstützt	▲ ▲ ▲ ▲
Drücken Sie F1, um Hilfe zu erhalten.	1	1 1	1 1	<u> </u>	direkten Datenaustausch, unterstützt	∽ Änd

23. Under the tab 'Operating parameters', keep the standard settings as shown below. Clock synchronization is not used. (\rightarrow Operating parameters \rightarrow OK)

'arameter	Wert
3 🔄 Stationsparameter — DP-Alarm-Mode	DPV1
DPV1-Alarme	
-	
— Betrieb bei Soll <> Istausbau — Störfrequenzunterdrückung	
— Kennungsbezogene Diagnose — Modulstatus	
Kanalbezogene Diagnose	
—)) Steckplatz —)) Kanalnummer	

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24. Now, the submodules inserted in the ET200S have to be moved with Drag&Drop to the configuration table. We are starting with the power module '**PM-E DC24V**' which is dragged to Slot 1. By double clicking on the '**PM-E DC24V**', you are opening its properties. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF \rightarrow PM \rightarrow PM-E DC24V \rightarrow PM-E DC24V)

🖳 HW Konfig - [SIMATIC 300(1) (Konf	figuration) CPU315F_	PROFIsafe]					
III Station Bearbeiten Einfügen Zielsy	stem Ansicht Extras I	Fenster Hilfe					_ & ×
	🛍 🋍 🚯 🗖 🖞	₩?					
	đ.						<u> </u>
					Suchen:		mt mi
2 8 CPU 315E-2 PN/DP	PROFI	BUS(1): DP-M	astersystem (1)		рс. Г	CI 1 1	
X1 MPI/DP					Flour:	Standard	_
F X2 PN-10		📷 (3) IM	151-1		± 🚊	IQ-SENSE	
	1					Motorstarter PM	
Ethermon(1): DBOEINET IO Contern	-1 (100)					PM-E DC2448	3V
Ethemet(1): FROFINE 140-System	(100)				-	PM-E DC2448	3V/ AC24230
						PM-E DC2448	3V7 AL24230
						PM-E DC24V	
(3) IM151-1 HE			Adressen r	acken		PM-E F DC24V	
			1.100000112			PM-EFpm DC	24V
Steckplatz Baugruppe B	Bestellnummer	E-Adresse	A-Adres D	K		PM-E F pp DC2	24V
2 PM-E DC24V 66	57/138-4UAUT-UAAU		204			PM-E F pp DC2	24V
3					E 📫 IM1	51-1 HF	
4						51-1 Standard	_
5				+	CE C 7 1 20	404.01 0440	<u></u>
7					Powermod	ul PM-E für Elektror	nikmodule, 💾
8				-	DC24V, mi	it Diagnose	
Drücken Sie Et, um Hilfe zu erhalten					J		Öpd

25. Under parameters, activate 'Diagnosis: Load voltage L+ missing' with a \checkmark . (\rightarrow Diagnosis: Load voltage L+ missing $\rightarrow \checkmark \land OK$)

	Wert
∃ 🔄 Parameter └☱ Diagnose: fehlende Lastspannung L+	

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26. Then, we drag the digital input module '**2DI DC24V ST**' to the 2nd and 3rd slot. The order number and the version can be read off the module. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF \rightarrow DI \rightarrow 2DI DC 24V ST \rightarrow 2DI DC 24V ST)

HW Konfig - [SIMATIC 300(1) (K	onfiguration) CPU3151 elsystem Apsicht Extras	F_PROFIsafe] Feaster Hilfs						-	
			¢						
									ㅋ미지
						S <u>u</u> chen:			nt ni
I FS 307 2A 2 CPU 315F-2 PN/DP X1 MPI/DP		FIBUS(1): DP-M	astersystem	(1)	•	Profil:	Standard		•
X2 PN-IO 3 - 4 - Ethernet(1): PROFINET-IO-Syst (3) IM151-1 HF	- em (100)		4151-1	sen <u>p</u> ack	.en			2DI AC120V ST 2DI AC230V ST 2DI DC24V HF 2DI DC24V HF 2DI DC24V ST 2DI DC24V ST 4 DI NAMUR 4 DI UC24.,48V 4/8 F-DI DC24V	
Steckplatz Baugruppe	Bestellnummer	E-Adresse	A-Adres	D I	<u> </u>			4/8 F-DI DC24V	
1 PM-E DC24V	6ES7 138-4CA01-0AA0	0.0.01		2043*	-			4DI DC24V HF	
2 2DF DC24V ST	6ES7 131-48B01-0AA0	1.01.1						4DI DC24V HF	
4								4DI DC24V ST	_
5							1 40004 014		<u> </u>
8 					•	Digitaleir Standard	1-48801-044 Igabemodul D	JU DI 2xDC24V,	<u> </u>
, Einfügen möglich						10			Änd //

27. Then, we drag the digital output module '4 DO DC24V/0.5A ST' to the 4th slot. The order number and the version can be read off the module. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF \rightarrow DO \rightarrow 4 DO DC24V/0.5A ST)



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28. Now, another power module '**PM-E DC24...48V/AC24...230V**' is moved to the 5th slot. The order number and the version can be read off the module. By double clicking on '**PM-E**

DC24...48V/AC24...230V', you open its properties. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF \rightarrow PM \rightarrow PM-E DC24...48V/AC24...230V \rightarrow PM-E DC24...48V/AC24...230V)

🔣 HW Konfig	- [SIMATIC 300(1) (K	onfiguration) CPU315	F_PROFIsafe]	-			
D Station B	earbeiten Einfügen Zie	elsystem Ansicht Extras	Fenster Hilfe	e			<u>_8×</u>
D 🚅 🔓		a 🐽 🎰 🗈 🗆	₩ №?				
😑 (0) UR						-	
	PS 307 26						Suchen:
2	CPU 315F-2 PN/DP	PRO	FIBUS(1): DP-M	astersystem	(1)	_	Profil: Standard
XI	MPI/DP						
$\begin{bmatrix} \frac{\chi_2}{3} \end{bmatrix}$	PN-ID		(3) IN	4151-1			
							🕀 🧰 IQ-SENSE
Ether	et(1): PBOEINET-IO-Sust	em (100)					🕀 🧰 Motorstarter
						<u> </u>	PM-E DC2448V/ AC24230V
						<u> </u>	- PM-E DC2448V/ AC24230V
(3)	IM151-1 HF			Adres	sen pac	:ken	
Steckplatz	Baugruppe	Bestellnummer	E-Adresse	A-Adres	D	К	PM-E F DC24V
1	PM-E DC24V	6ES7 138-4CA01-0AA0			2043*		PM-E F pm DC24V
2	2DI DC24V ST	6ES7131-4BB01-0AA0	0.00.1				
3	2DI DC24V ST	6ES7 131-4BB01-0AA0	1.01.1			_	PM-E F pp DC24V
4	4D0 DC24V/0,5A S	6ES7 132-4BD01-0AA0		0.00.3			
5	PM-E DC24/48V/ A	(6ES7138-4CB10-0AB0			2042*		
6							6ES7 138 Auswählen der Hardware
1							DC24 48V/AC24 230V mit Diagnose
18						-	und Sicherung
ı Einfügen möglici	1						Änd

29. Under Parameters, activate 'Diagnosis: Load voltage L+ missing' with a \checkmark . (\rightarrow Diagnosis: Load voltage L+ missing $\rightarrow \checkmark \rightarrow OK$)

Parameter	Wert
Image: Signal Stress Image: Signal Stress	

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30. Next, we are dragging the fault-tolerant digital input module '4/8 F-DI DC24V' to the 6th slot. The order number and the version can be read off the module. By double clicking on '4/8 F-DI DC24V', you open its properties. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF \rightarrow DI \rightarrow 4/8 F-DI DC24V \rightarrow 4/8 F-DI DC24V)

HW Ko	nfig - [SIM	ATIC 300(1)	(Konfiguration) CPU315	5F_PROFIsafe]							
III Station	n Bearbeit	en Einfügen	Zielsystem Ansicht Extras	Fenster Hilfe						<u> </u>	
	a∼ ⊡ ⊊	1 6 1	e 11 11 10 10 10	₩ .							
	B						-				ㅋ믜푀
								S <u>u</u> chen:			ntai
1		2A 15E-2 PN/DE	PRO	DFIBUS(1): DP-M	lastersystem	(1)		5 (1			
XT	MPI/D	p					•	Profil:	Standard		
F X2	PN-10			🛋 (3) IN	4151-1				🖻 🧰 DI		
3					WZAD					2DI AC120V ST	
4	l									2DLAC230V ST	8
E	thernet(1): P	ROFINET-IO-Sy	vstem (100)							201 DC24V HF	
10										2DI DC24V NI	
1		1					<u>ت</u>			2DI DC24V ST	
							<u> </u>			4 DI NAMUR	
	(3) IM151	-1 HE			Adres	en nark	en		- [4 DI UC2448V	(
						- Danie				4/8 F-DI DC24	
Steckpla	atz [Baugruppe	Bestellnummer	E-Adresse	A-Adres	D K	<			4/8 F-DI DC24	X
1	P	M-E DC24V	6ES7138-4CA01-0AA0			2043*	-				(
2	21	DI DC24V ST	6ES71314BB01-0AA0	0.00.1						4DI DC24V HE	
3	21	DI DC24V ST	6ES7131-4BB01-0AA0	1.01.1						4DI DC24V ST	-
$\frac{4}{5}$	4	DO DC24V/0,54	A S16ES7 132-4BD01-0AA0		0.00.3	0040	-		10 M IN 🖳		1 C
5	P	M-E DU24/48V/	CEC7 138-4LB10-0AB0	2.7	2.5	20421		CE 67 12	0 454.01 04.0	0	
7	4	0 F-DI DC24V	0E37 130-4FA01-0AB0	t	2			Digitaleir	igabernodul D	0 1 4/8xDC24V.	-<
8							T	sicherhei	tsgerichtet		
I				1				J			
Einfügen mö	öglich										Änd //

31. Under the tab 'Addresses', you can change the module's address areas. However, it has to be ensured that identical values are assigned to the start addresses of the output and input areas. (\rightarrow Addresses \rightarrow 200 \rightarrow 200)

gemein A	dressen Param	eter		
Eingänge				
Anfang:	200	Prozeßabbild:		
Ende:	205	OB1-PA		
Ausgänge				
Anfang:	200	Prozeßabbild:		
Ende:	203	081-PA 💌		
	1		1	

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- 32. Under the tab 'Parameters', you can change the following parameters:
- F-Parameters for PROFIsafe
- Module parameters
- Channel-specific parameters

Here, a two channel emergency stop switch is to be connected to channels 0 and 4, and the position switches for monitoring a 2-channel guard door to channels 1 and 5. Perform the following settings, and then accept them with '**OK**'. (\rightarrow Parameter \rightarrow OK)

Parameter	Wert	1		
🖨 🔄 F-Parameter				
– 🗐 F_Quell_Adresse	2002; CPU 315F-2 PN/DP			
–≝) F_Ziel_Adresse	1022			
–🗐 DIL-Schalterstellung (90)	1111111110			
– 🗐 F_Überwachungszeit (ms)	200			
🗄 🔄 Baugruppenparameter				
— 🗐 Eingangsverzögerung	3 (ms)			
—🗐 Kurzschlusstest	zyklisch			
🖨 🤤 Kanal 0, 4				
- Aktiviert				
–🗐 Auswertung der Geber	2v2-Auswertung			
–🗐 Art der Geberverschaltung	2-kanalig äquivalent			
— 🗐 Diskrepanzverhalten	0 - Wert bereitstellen			
└─ Diskrepanzzeit (ms)	100			
🖨 🥘 Kanal 1, 5		^L		
– 🗐 Aktiviert				
– 🗐 Auswertung der Geber	1v1-Auswertung			
– 🗐 Art der Geberverschaltung	1-kanalig			

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Note regarding "F-Parameters"

The PROFIsafe addresses have to be unique network-wide as well as station-wide. To prevent wrong parameter assignments, the addresses are assigned automatically. The PROFIsafe

'F_Destination_Address' has to be set at the F-module with a DIL switch. The F-CPU provides the PROFIsafe **'F_Source_Address'** (F-Parameter 'Basis for PROFIsafe addresses').

During the F-monitoring time, a valid current safety message has to be received from the F-CPU. Otherwise, the F-module enters the safe mode.

On the one hand, the F-monitoring time should be so high that message delays are tolerated, on the other hand so low that the process can respond as fast as possible if there is an error, and is executed without detriment. Calculation tables that SIEMENS makes available on the Internet provide support for determining the timing. (http://www4.ad.siemens.de/ww/view/de/ under the Contribution ID 19138505)

Note regarding "Module Parameters"

For a cyclical short circuit test, the internal encoder supplies have to be used for all encoders connected to the F-module, and channels that are not used have to be deactivated. Otherwise, errors are detected on these channels. For our example, the settings of the module parameters should not be changed.

Note regarding "Channel x, y" parameters: 'Encoder Evaluation' and 'Type of Encoder Interconnection' have to parameterized according to the encoder wiring. The encoder wiring and the safety quality of the encoder are decisive for the attainable safety class. Deactivate the unused channels 2, 6 and 3, 7.

Note regarding 2of2 evaluation, Discrepancy performance and **discrepancy time** If different levels (when checking for non-equivalence: same levels) are ascertained for two associated input signals ('**2of2 evaluation**' of the encoders), the '**Discrepancy time**' that can be parameterized here starts. While the discrepancy time is running within the module, the affected input channel makes the '**last valid value**' or '**0**' available to the F-CPU, depending on the parameter assignment of the discrepancy performance.



33. Now, close the message window for the necessary 'New generation of the safety program'. (\rightarrow Close \rightarrow OK)

Achtung, Sie haben eine sicherhei	tsrelevante Projektierung geänd	art, wenn sie die Änderung ü
		<u>•</u>
Meldung	0)	- 100-1-1
Jobjekteigenschälten (4052.207	رہ ا	Hilfetext
Achtung, Sie haben eine Projektierung geändert, jübernehmen ist eine Ner	e sicherheitsrelevante wenn sie die Änderung ugenerierung des	Gehe zu
Schließen Speichern		Hilfe

Programming



34. Next, we are dragging the fault-tolerant output module '4 F-DO DC24V/2A' to the 7th slot. The order number and the version can be read off the module. By double clicking on the '4 F-DO DC24V/2A', its properties are opened. (\rightarrow PROFIBUS-DP \rightarrow ET 200S \rightarrow IM151-1 HF \rightarrow DO \rightarrow 4 F-DO DC24V/2A \rightarrow 4 F-DO DC24V/2A)



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35. In addition to the '**Addresses**' that are changed here to 210, the following parameter values can be changed under the tab '**Parameter**':

- F-Parameter for PROFIsafe
- Module parameters/channel-specific parameters

Here, on Channel 0, the press -our consumer- is to be enabled indirectly by means of two contactors.

Perform the following settings, and then accept them with 'OK'. (\rightarrow Parameter \rightarrow OK)

Parameter	Wert	
🛛 🔄 Parameter		
🖨 🦳 F-Parameter		
–≝ F_Quell_Adresse	2002: CPU 315F-2 PN/DP	
– F_Ziel_Adresse	1021	
–≝) DIL-Schalterstellung (90)	1111111101	
└── F_Überwachungszeit (ms)	200	
🗄 🔄 Baugruppenparameter		
🔁 🔄 DO-Kanal 0		
-E Aktiviert		
–🗐 Rücklesezeit	1 (ms)	
Diagnose: Drahtbruch		
🗖 🦳 DO-Kanal 1		
- Aktiviert		
–🗐 Rücklesezeit		
Diagnose: Drahtbruch		
🗖 🔄 DO-Kanal 2		
Aktiviert		
C Province Produktional		T



Note regarding "DO Channel x" Parameters

Each output channel has its own parameterizable readback time. This time specifies the maximum duration of the shut down test for the corresponding channel, and thus also the readback time for the shut down cycle of the channel. A wire break test is used for monitoring the connection from the output to the consumer. Deactivate channels that are not used.

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36. Now close the message window for the required 'New generation of the safety program'. (\rightarrow

wenn sie die Änderung ü
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Hilfetext
Hilfetext
Hilfetext Gehe zu
Hilfetext Gehe zu
Hilfetext Gehe zu

37. By clicking on $\frac{1}{100}$, the configuration table is saved and compiled. Then, by clicking on $\frac{1}{100}$, the configuration can be loaded to the PLC. The operating mode switch at the CPU should be on Stopl. (\rightarrow $\frac{1}{100}$)

Contraction Contraction	[SIMATIC 300(1) (Ko	onfiguration) CPU315	F_PROFIsafe]						
0 Station Bea	arbeiten Einfügen Zie	lsystem Ansicht Extras	Fenster Hilf	•				_	BX
0 😂 🔓		1 🛍 🋍 🕞 🗖	₩ №?						
	Speichern und übe	rsetzen				_			믜×
							Suchen		nt mi
1 P	S 307 2A				(1)				
2 <u>C</u>	PU 315F-2 PN/DP		FIBUS(I), DF-W	lastersystem	0	-	Profil:	Standard	-
X2 3 4 Ethernel	W-IO			4151-1		T		2D0 DC24V/0,5A ST 2D0 DC24V/2A HF 2D0 DC24V/2A HF 2D0 DC24V/2A ST 2D0 DC24V/2A ST 2D0 DC24V/2A ST 2R0 N0 DC24120V/5A AC24	23
(3)	IM151-1 HF			Adres	sen gao) ken		2R0 N0 DC24120V/5A AC24 2R0 N0/NC DC24120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A	23 C24
(3) (3) Steckplatz	IM151-1 HF	Bestellnummer	E-Adresse	Adres	sen <u>p</u> ac	▶ ken К		2R0 N0 DC24.120V/5A AC24 2R0 N0/NC DC24.120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A	23 C24
(3) (3) (3) (3) (3) (3) (3) (3) (3) (3)	M151-1 HF Baugruppe PM-E DC24V	Bestellnummer 6ES7 138-4CA01-0AA0	E-Adresse	Adres	sen gac D 2043*	▶ ken K		2R0 N0 DC24120V/5A AC24 2R0 N0/NC DC24120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 D0 DC24V/2A 4 D0 DC24V/0A ST	23 C24
Steckplatz	M151-1 HF Baugruppe PM-E DC24V 2DI DC24V ST	Bestellnummer 6ES7 138-4CA01-0AA0 6ES7 131-4BB01-0AA0	E-Adresse	Adres	sen pac D 2043*	ken K		2R0 N0 DC24.120V/5A AC24 2R0 N0/NC DC24.120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4D0 DC24V/05A ST 4D0 DC24V/05A ST 4D0 DC24V/05A ST	23 C24
Steckplatz 1 2 3	M151-1 HF Baugruppe PM-E DC24V 2DI DC24V ST 2DI DC24V ST 2DI DC24V ST	Bestellnummer 6ES7 138-4CA01-0AA0 6ES7 131-4BB01-0AA0 6ES7 131-4BB01-0AA0	E-Adresse	Adres	sen pac D 2043*	ken		2R0 N0 DC24.120V/5A AC24 2R0 N0/NC DC24.120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4D0 DC24V/0,5A ST 4D0 DC24V/0,5A ST 4D0 DC24V/2A ST 4D0 DC24V/2A ST	23 C24
Steckplatz 1 2 3 4	M151-1 HF Baugruppe PM-E DC24V 2DI DC24V ST 2DI DC24V ST 4D0 DC24V/0,5A S	Bestellnummer 6ES7 138-4CA01-0AA0 6ES7 131-4BB01-0AA0 6ES7 131-4BB01-0AA0 6ES7 132-4BD01-0AA0	E-Adresse 0.00.1 1.01.1	Adres	sen pac D 2043*	ken K		2R0 N0 DC24.120V/5A AC24 2R0 N0/NC DC24.120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4D0 DC24V/05A ST 4D0 DC24V/05A ST 4D0 DC24V/2A ST 4D0 DC24V/2A ST	23 C24
(3) Steckplatz 1 2 3 4 5	M151-1 HF Baugruppe PM-E DC24V 2DI DC24V ST 2DI DC24V ST 4DD DC24V/0,5A S PM-E DC24/48V/AI	Bestellnummer 6ES7 138-4CA01-0AA0 6ES7 131-4BB01-0AA0 6ES7 131-4BB01-0AA0 6ES7 132-4BD01-0AA0 6ES7 138-4CB10-0AB0	E-Adresse	Adres A-Adres 0.00.3	sen pac D 2043* 2042*	ken K		2R0 N0 DC24.120V/5A AC24 2R0 N0/NC DC24.120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 D0 DC24V/05A ST 4D0 DC24V/05A ST 4D0 DC24V/2A ST 4D0 DC24V/2A ST	23 C24
(3) Steckplatz 1 2 3 4 5 6	M151-1 HF Baugruppe PM-E DC24V 2DI DC24V ST 2DI DC24V ST 4D0 DC24V/O5A S PM-E DC24/48V/A1 4/8 F-DI DC24V	Bestellnummer 6ES7 138-4CA01-0AA0 6ES7 131-4BB01-0AA0 6ES7 131-4BB01-0AA0 6ES7 132-4BD01-0AA0 6ES7 138-4CB10-0AB0 6ES7 138-4CB10-0AB0	E-Adresse 0.00.1 1.01.1	Adres A-Adres 0.00.3 200203	sen gac 2043* 2042*	ken K	ES7.13	2R0 N0 DC24.120V/5A AC24 2R0 N0/NC DC24.120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 D0 DC24V/2A 4D0 DC24V/05A ST 4D0 DC24V/05A ST 4D0 DC24V/2A ST 4D0 DC24V/2A ST 4D0 DC24V/2A ST	23 C24
Steckplatz 1 2 3 4 5 6 7	M151-1 HF Baugruppe PM-E DC24V 2DI DC24V ST 2DI DC24V ST 4D0 DC24V/0,5A S PM-E DC24/48V/AI 4/8 F-DI DC24V 4 F-D0 DC24V/2A	Bestellnummer 6ES7 138-4CA01-0AA0 6ES7 131-4B801-0AA0 6ES7 131-4B801-0AA0 6ES7 132-4BD01-0AA0 6ES7 138-4CB10-0AB0 6ES7 138-4CB10-0AB0 6ES7 138-4FB01-0AB0	E-Adresse 0.00.1 1.01.1 200205 210214	Adres A-Adres 0.00.3 200203 210214	sen pac D 2043* 2042*	ken K	€ES71: Digitalar	2R0 N0 DC24.120V/5A AC24 2R0 N0/NC DC24.120V/5A A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 F-D0 DC24V/2A 4 D0 DC24V/0,5A ST 4D0 DC24V/0,5A ST 4D0 DC24V/2A ST 4D0 DC24V/2A ST 4D0 DC24V/2A ST 38-4FB01-0AB0 isgabemodul D0 4xDC24V/2A,	23 C24 ►



Note: Make sure that your programming device is connected to the CPU by means of the MPI.

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38. The CPU 315F-2 PN/DP is confirmed as destination module for the loading process. (\rightarrow OK)

saugruppe	Träger	Steckplatz
PU 315F-2 PN/DP	0	2
Alles markieren		

39. In the dialog window below, the connected devices in the network can be '**Display**'ed. The CPU's MPI address in the MPI network is then selected. If you are connected to only one CPU, accept with '**OK**'. (\rightarrow Display \rightarrow OK)

3augruppenträg	jer: 0 🚊			
Steckplatz:	2 -			
Zielstation:	🖸 Lokal			
	C Über Net	zübergang zu err	eichen	
Anschluß an Z	ielstation eingeber	і:		
MPI-Adresse	Baugruppentyp	Stationsname	CPU-Name	Anlagenkennzeichen
2	CPU 315F-2	SIMATIC 3	CPU 315	
Treichbare Teil	nehmer:			
incloring die 1 om	CPU 315F-2 P	SIMATIC 30	CPU 315	
2				
2				
2				
2				
2				
2				

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5. **PROGRAM EXAMPLE**



In the safety program below, a press as Consumer 1 is to be shut down at a safety-related production area if:

- a guard door that is monitored by two contacts is opened, or •
- an emergency stop that is connected to two channels is operated •

After operating the emergency stop or after opening the guard door, a local user acknowledgement is required to restart production.

In our example, the following is to be programmed, and generated into a safety program: a faulttolerant block with a guard door function, an emergency stop function (safety circuit for switch-off in the case of emergency stop and if the guard door is open), a feedback circuit (as reclosing protection if the consumer is faulty), and a user acknowledgement for reintegration.



The precondition for programming is a hardware configuration that is set up correctly, as described in Chapter 4.

SIMATIC Manager - [CPU315F]	_PROFIsafe F:\0_57_	Projekte\CPU315F_]				_ 🗆 🗙
🛃 Datei Bearbeiten Einfügen Zi	elsystem Ansicht Extra	s Fenster Hilfe				_ 8 ×
		📰 💼 < Kein Filte	ı>	- 7/ 28 @		
E B CPU315F_PROFIsafe	Objektname	Symbolischer Name	Erstellsprache	Größe im Arb	Тур	Version (Hea
E SIMATIC 300(1)	Systemdaten				SDB	
□- U CPU 315F-2 PN/DP	🕀 0B1			38	Organisationsbaustein	0.1
⊡ 🛐 S7-Programm[2]	500 FB600	F_IO_CGP	F-AWL	15252	Funktionsbaustein	1.0
B Quellen	5 FB601	F_CTRL_1	F-AWL	9574	Funktionsbaustein	1.2
Bausteine	502 FB602	F_CTRL_2	F-AWL	5300	Funktionsbaustein	1.3
	5 DB600	F_GLOBDB	F-DB	226	Datenbaustein	5.4
	5 DB601	F00200_4_8_F_DI_DC24V	F-DB	664	Instanzdatenbaustein zu FB 600	0.0
	DB602	F00210_4_F_D0_DC24V	F-DB	664	Instanzdatenbaustein zu FB 600	0.0
	•					•
Drücken Sie F1, um Hilfe zu erhalten.			PC Adapt	er(PROFIBUS)		1

F-Periphery Data Blocks

For each F-periphery, an "F-Periphery DB" is generated automatically in the hardware configuration during compilation, and a symbolic name is entered for it at the same time in the symbol table. You can view the F-periphery DBs generated for the sample periphery in the block container. These are the F-data blocks DB 601 and DB 602.

The symbolic name for the F-periphery DB is generated from the following: the fixed prefix "F", the start address of the F-periphery, and the name entered in the hardware configuration in the object properties for F-periphery (17 characters maximum).

F-Global DB

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The F-global DB "DB 600" is a fault-tolerant data block that is inserted automatically. It contains all the global data of the safety program as well as additional information that the F-system needs.

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Inputs and Outputs in the Safety Program

For programming the sample safety program, the following addresses and fault-tolerant periphery DBs are available to you, according to the hardware configuration described in Chapter 4.

You can access the variables of the F-periphery DB by means of a 'fully qualified DB access' (that is, by entering the symbolic name of the F-periphery DB and the name of the variable).

Configured Hardware	Start Address	Symbolic Name	F-Periphery DB
Digital Electronic Module	0		
2DI DC24V ST (6ES7 131-			
4BB01-0AA0)			
Digital Electronic Module	1		
2DI DC24V ST (6ES7 131-			
4BB01-0AA0)			
Digital Electronic Module	0		
4DO DC24V/0,5A ST			
(6ES7 132-4BD01-0AA0)			
Fault-Tolerant Digital Input	200	F00200_4_8_F_DI_DC24V	DB 601
Module 4/8 F-DI DC24V			
(6ES7 138-4FA01-0AB0)			
Fault-Tolerant Digital	210	F00210_4_F_DO_DC24V_2A	DB 602
Output Module F-DO			
DC24V/2A (6ES7 138-			
4FB01-0AB0)			



1. Now, open the symbol table in your project. (\rightarrow Symbols)

SIMAT	IC Manager - [CPU315F	_PROFIsafe F:\	0_57_Projekte\CPU315F_]				
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	# # × • •		🔒 🔚 🔠 🚺 💽 Kein Fi	lter >	22 10 1		
🗆 🎒 CF	PU315F_PROFIsafe	Objektname	Symbolischer Name	Тур	Größe Auto	r Änderungsdatum	k
		🛅 Quellen	100	Quellordner	10770	17.01.2006 14:3	3:11
5	S7-Programm(2)	Bausteine		Bausteinordner offline		17.01.2006 15:3	3:55
	Quellen	Symbole		Symboltabelle	3788	17.01.2006 15:2	6:57
	🔂 Bausteine						
							-
		•		for an and the second			<u> </u>
Drücken Sie	F1, um Hilfe zu erhalten.			PC Adapter(PROF	IBUS)	3788 Bytes	11.

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2. In the symbol table, assign symbolic names for the fault-tolerant and the standard inputs and

outputs as well as for the flags used. Save the symbol table and close it. (\rightarrow

		e Symb	ble		-	₩ №
	sherp βymbol Δ	Ad	resse	Dat	entyp	Kommentar
	CTRL_1	FB	601	FB	601	F_: Cycle Control and Mode
2	F_CTRL_2	FB	602	FB	602	F_: Test Block and Programme Run Control
3	F_GLOBDB	DB	600	DB	600	F_:F_Global_Data Block
ŧ 🔤	F_IO_CGP	FB	600	FB	600	F_: Driver Block In-Output with Channel Granular Passivatio
5	F00200_4_8_F_DI_DC24V	DB	601	FB	600	
6	F00210_4_F_DO_DC24V_2A	DB	602	FB	600	
	HV01-H100	A	210.0	BOO	DL .	Verbraucher 1(Pressensteuerung)
3	HV01-H200	A	0.0	BOG)L	Lampe 1 Quittieren
3	HV01-S209	E	200.0	BOG)L	Not-Halt-Schalter 2-kanalig verdrahtet
0	HV01-S210	E	200.1	BOG	DL .	Schutztürkontakt 1
1	HV01-S211	E	200.5	BOG	DL .	Schutztürkontakt 2
2	HV01-S220	E	0.0	BOO	DL .	Taster 1: Quittieren
3	HV01-S221	E	0.1	BOG	DL .	Schalter 2: Anlage Ein
4	HV01-S222	E	1.0	BOG)L	Rückführkreis Verbraucher 1
5	Schatten_Ein	M	10.0	BOG	DL .	Betriebsmässiges Einschalten
6		0				

3. In the SIMATIC Manager, set up an F-FB. (\rightarrow Blocks \rightarrow Insert New Object \rightarrow Function Block)

SIMATIC Manager - [CPU315]	F_PROFIsafe F:\0_9	57_Projekte\C	PU315F_]			
🛃 Datei Bearbeiten Einfügen 2	Zielsystem Ansicht Ex	tras Fenster	Hilfe			<u>_ 8 ×</u>
		8- 8- 8-	🔁 🛛 < Kein Filte	1>	- 7/ 20	
CPU315F_PROFIsafe CPU315F_PROFIsafe CPU315F-2PN/DP	Dbjektname Dbjektname Systemdaten DB1 FB600 FB601 hneiden ren gen en sobjekt einfügen stem rdrahten eine vergleichen einkonsistenz prüfen	Symbolische F_IO_CGP F_CTRL 1 Ctrl+X Ctrl+C Cdrl+V Del	r Name -F_DI_DC24V D0_DC24V Organisationsl Funktionsbaus Funktion Datenbausteir Datentyp Variablentabel	F-AWL F-AWL F-AWL F-AWL F-DB F-DB F-DB F-DB F-DB	Größe im Arbeits 38 15252 9574 5300 226 664 664	Typ V SDB - Organisationsbaustein (Funktionsbaustein ' Funktionsbaustein ' Datenbaustein 5 Instanzdatenbaustei (Instanzdatenbaustei (
Umbe Objek Spezi	nennen iteigenschaften elle Objekteigenschaften	F2 Alt+Return				Þ

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4. Under the tab 'General - Part 1', enter the 'Name', and the 'Symbolic Name'. As programming language, select 'Programming Language F-FBD' and close the dialog field with 'OK'. (\rightarrow FB1 \rightarrow FB_MAIN PROGRAM \rightarrow F-FBD \rightarrow OK)

genschaften - Funktion	sbaustein	2
Allgemein - Teil 1 Allgeme	in - Teil 2 Aufrufe Attribute	
Name:	FB1	🔽 Multiinstanzfähig
Symbolischer Name:	FB_HAUPTPROGRAMM	
Symbolkommentar:		
Erstellsprache:	F-FUP	
Projektpfad:	FUP GBAPH	
Speicherort des Projekts:	F-FUP	-
Erstellt am:	Code 21.01.2006 20:03:43	Schnittstelle
Zuletzt geändert am:	21.01.2006 20:03:43	21.01.2006 20:03:43
Kommentar:		A
ОК	<u> </u>	Abbrechen Hilfe

5. Open 'FB1' by double clicking in the SIMATIC Manager. (\rightarrow FB1)

SIMATIC Manager - [CPU315F] Datei Bearbeiten Einfügen Zi	_PROFIsafe F:\0_57_ elsystem Ansicht Extra	_Projekte\CPU315F_] s Fenster Hilfe			×
D 🗃 🏭 🕺 🖻 🖻	M 9 S <u>P</u>	🖽 🛅 🗲 Kein Filte	et >	· 7/ 280	
E DU315F_PROFIsafe	Objektname	Symbolischer Name	Erstellsprache	Größe im Arbeits	Тур
□	Systemdaten	1000	1000		SDB -
S7-Programm(2)	FB1	FB HAUPTPROGRAMM	F-FUP	30 38	Funktionsbaustein
Duellen	53 FB600	F_IO_CGP	F-AWL	15252	Funktionsbaustein
	5 FB601	F_CTRL_1	F-AWL	9574	Funktionsbaustein
	FB602	F_CTRL_2 F_GLOBDB	F-AWL E-DB	5300	Funktionsbaustein
	DB601	F00200_4_8_F_DI_DC24V	F-DB	664	Instanzdatenbaustei (
	5 DB602	F00210_4_F_D0_DC24V	F-DB	664	Instanzdatenbaustei (
					<u>Þ</u>
Drücken Sie F1, um Hilfe zu erhalten.		PC Adapt	er(PROFIBUS)	38 Byte	es //

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6. Enter the 8-character password twice, and accept with 'OK'. (\rightarrow pw_fprog \rightarrow pw_fprog)

Altes Passwort	ļ		
Neues Passwort	******		
Passwort bestätigen	*******		
Zugangsberechtigung			
Gültigkeit (in Minuten):	0	Aufi	neben

7. Now, in the editor 'LAD/STL/FBD', set up a static variable with the name 'ENA_GUARDDOOR' (enable guard door). (\rightarrow STAT \rightarrow ENA_GUARDDOOR)

KOP/AWL/FUP - [FB1 "I	FB_HAUP	PTPROGRAMM" CP stem Test Ansicht	U315F_PROFIsa Extras Feaster	fe\SIMATIC 3 Hilfe	00(1)\CPU 315F-2	2 PN/DP\\FB1]
				:« »! []		- I de la calencia de la
	Inl	halt von: 'Umgebu	ung\Schnittst	elle\STAT'		
🖃 🕼 Schnittstelle		Name	Datentyp	Adresse	Anfangswer	1
IN IN	13	FRG_SCHUTZTUER	Bool	0.0	FALSE	Neues Netzwerk
тто от	12					🕂 🗑 Bitverknüpfung
UT_UN_OUT			201 201			
STAT						🕂 🦳 Umwandler
						DB-Aufruf
	4				•	🗄 🛱 Sprünge
						🗄 🔢 Festpunkt-Fkt.
					<u> </u>	🗄 🦳 Verschieben
FB1 : Titel:						E Trogrammsteuerung
Netzwerk 1: Titel:						🗄 💮 Statusbits
Contractor and the second second						🗄 🧿 Wortverkpüpfung

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Note:

The programming languages F-FBD and F-LAD basically correspond to the standard FBD/LAD. For programming, the standard *FBD/LAD Editor* in *STEP7* is used.

F-FBD and F-LAD differ from the standard essentially through limitations in the operation set, and the useable data types and operand areas.

The following is listed in the program element catalog:

- The operations that are supported
- F-FBs and F-FCs from the block container of your S7 program
- F-blocks from F-libraries, such as F-application blocks of the F-library *Distributed Safety* (V1), for guard door surveillance etc.
- Multi-instances

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8. Insert the fault-tolerant application block "FB 217 "F_SFDOOR" (guard door surveillance) from the block container 'F-Application Blocks', set up the instance DB and initialize the inputs and outputs, as shown in the figure below. (\rightarrow Libraries \rightarrow F-Application Blocks \rightarrow FB217 \rightarrow DB217 \rightarrow Yes)

Image: Strate	××
Inhalt von: 'Uagebung\Schnittstelle\STAT' Schnittstelle Anae Datentyp Adresse Anfar F-Application Blocks FB179 F_SCA_I CONVERT FB179 F_SCA_I CONVERT	×
FB1 : Sicherheitstechnisches Hauptprogramm FB1 : Sicherheitstechnisches Hauptprogramm Image: Schutztürüberwachung Image: DB217 Image: DB217 Image: BB18 F_CTU EC_TC	
"HV01-S210" IN1 "HV01-S211" IN2 "HV01-S211" IN2 "F50200_4_8_F	
"F_GLOBDB". VKB1 _ ACK_NEC DIAG @"HV01-S220" _ ACK EN0	
Programmelemente E Aufrufstruktur	
X X	
KOP/AWL/FUP (30:150) Der Instanz-Datenbaustein DB 217 existiert nicht. Soll er generiert werden? Ja Nein Hilfe	

The non-safety related "acknowledgement button" signal from the standard program is colored yellow.

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1

Notes: If you need the Boolean constants "0" and "1" in your safety program to initialize parameters for block calls, access the variables "RLO0" and "RLO1" in the F-Global DB by means of a fully qualified DB access ("F_GLOBDB".RLO0 or "F_GLOBDB".RLO1). In our example, the F-Global DB has the number "DB 600" in the block container.

The enable input EN and the enable output ENO must not be wired, initialized with "0" or evaluated in the case of fault-tolerant programming!

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FB 217 Connections:

Inputs	Parameter	Data	Description	Default
-		Туре		
"HV01-S210"	IN1	BOOL	Guard door contact 1	0
"HV01-S210"	IN2	BOOL	Guard door contact 1	0
"F00200_4_8_F_DI_DC24V".QBA	QBAD_ IN1	BOOL	QBAD signal from F-Periphery	0
D			DB of Input IN1*	
"F00200_4_8_F_DI_DC24V".QBA	QBAD_ IN2	BOOL	QBAD signal from F-Periphery	0
D			DB of input IN2*	
"F_GLOBDB".RLO1	OPEN_NEC	BOOL	Fully qualified access to	1
			variable RLO1 from F-Global	
			DB**	
"F_GLOBDB".RLO1	ACK_NEC	BOOL	Fully qualified access to	1
			variable RLO1 from F-Global	
			DB**	
"HV01-S220"	ACK	BOOL	User acknowledgement (with	0
			button)	
Outputs	Parameter	Data	Description	Default
		Туре		
#ENA_GUARDDOOR	Q	BOOL	Enable Guard door	0
	ACK_REQ	BOOL	Acknowledgement request	0
	DIAG	BYTE	Service information	B#16#0

* = Both inputs QBAD IN1 and QBAD IN2 have to be wired; in our example both with the QBAD signal from the F-Periphery DB of the 4/8 F-DI to which the guard door position switches are connected. The block number of the F-periphery DB is provided by means of the symbolic name in the symbol table, or in the SIMATIC Manager.

** = OPEN NEC: 1 = OPEN is required at startup/ACK NEC: 1 = acknowledgement required



9. Set up the static variables "ENA_SafetyCircuit" (enable safety circuit), "HM01" and "HM02" as auxiliary flags. Insert a 'New network' and generate a program for the safety circuit as shown below. (\rightarrow ENA SafetyCircuit \rightarrow HM01 \rightarrow HM02 \rightarrow New Network)





10. In the 'SIMATIC Manager', open the F-library *Distributed Safety* (V1) and copy the F-application block F_TOF (FB 186) from the block container '**F-Application Blocks'\Blocks'** to the block container of your S7 program. It is needed by the following fault-tolerant application block. (\rightarrow FB186)

SIMATIC Manager - CPU315F_	PROFIsafe					
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😡 Distributed Safety (¥1) D:\	Programme\S		CPU315F_PROFIsal	fe F:\0_5	7_Projekte\CPU31	5F_ _
🖃 😔 Distributed Safety (V1)	Objektname	Symboli:	🖻 🎒 CPU315F_PROF	Isafe	Objektname	Symbolische
E ST F-Application Blocks	🔂 FB179	F_SCA_	E SIMATIC 300	0(1)	🚵 Systemdaten	4550
Source Files	55 FB181	F_CTU	E- CPU 315	F-2 PN/DP	🕞 OB1	
Blocks	55 FB182	F_CTD	⊡ <u>sn</u> S7-P	rogramm(2)	🕞 FB1	FB_HAUPT
E F-System Blocks	50 FB183	F_CTUC		luellen	555 FB186	
1	5 FB184	F_TP		dusteine	5 FB217	F_SFDOOF
11	5 FB185	F_TON			5 FB600	F_IO_CGP
11	5 FB186	F_TOF			5 FB601	F_CTRL_1
11	5 FB187	F_ACK_			5 FB602	F_CTRL_2
11	5 FB188	F_2HAN			DB217	
11	EFB189	F_MUTI			DB600	F_GLUBDB
11	5- FB190	F_1002			ST DRP01	F00200_4_
11	B211				PR DR PD 2	F00210_4_
11	EP215					
11	EP216					
11	FB217					
11	FB223	E SENC				
11		r payr				
J						
'Einfügen Funktionsbaustein': Wurde fü	r 1 von 1 Objekte	en erfolgreix	PC Adapter(PROFIBL	JS)	294 Bytes	

11. In your project, open the 'Object Properties' of FB 186. (\rightarrow FB186 \rightarrow Object Properties)

SIMATIC Manager - CPU315F_	PROFIsafe	where Constan Wilfo				<u> </u>
	an e		Kein Filter			
😡 Distributed Safety (¥1) D:\	Programme\Si	emens\St 🗆 🗙	CPU315F_PROFIsafe F:\0_9	7_Projekte\CPU315	F	
🖃 🧼 Distributed Safety (V1)	Objektname	Symbolisc 🔺	E B CPU315F_PROFIsate	Objektname	Symbolischer Name	
F-Application Blocks	55 FB179	F_SCA_I	SIMATIC 300(1)	🚵 Systemdaten	(***)	
Blocks	5 FB181	F_CTU	E- CPU 315F-2 PN/DP	🕒 0B1		
F-System Blocks	FB182	F_CTD		FB1	FB_HAUPTPROGRAMM	
	ED104		🔁 Bausteine	Objekt öffnen	Ctrl+Alt+O	
1	53 FB185	F TON		å	Ciel y	
	FB186	F TOF		Konieren	Ctrl+C	
	53 FB187	F_ACK_0		Einfügen	Gtrl+V	
1	55 FB188	F_2HANE		i		
1	55 FB189	F_MUTIN		i Loschen	Dei	
1	5 FB190	F_1oo2DI		i Neues Objekt einf	ügen 🕨	
	FB211	F_2H_EN		č Zielsystem	۲	
	FB212	F_MUI_F		Umverdrahten		
	FB216	F FDBAC		Bausteine vergleid	hen	
1	€⊒ FB217	F_SFDOC		Referenzdaten	•	
	FB223	F_SENDI		i Drucken		
	BJ FB224			Umbenennen	F2	-
	1			Objekteigenschaft	ten Alt+Return	<u>۲</u>
Zeigt Eigenschaften des markierten Obi	ekts zum Bearbeit	en an.		Spezielle Objektei	genschaften 🕨 🕨	

Preface	Notes	StartUp	Programming



12. Assign the symbolic name '**F**_**TOF**' to the F-application block FB 186. (\rightarrow F_TOF \rightarrow OK)

ullgemein - Teil1 Allgeme	in - Teil 2 Aufrufe Attribute	
Name:	FB186	Multiinstanzfähig
Symbolischer Name:	FTOF	_
Symbolkommentar:		
Erstellsprache:	F-AWL	
Projektpfad:	CPU315F_PROFIsafe\SIMA PN/DP\S7-Programm(2)\Bar	TIC 300(1)\CPU 315F-2 usteine\FB186
Speicherort des Projekts:	F:\0_S7_Projekte\CPU315F	<u> </u>
	Code	Schnittstelle
Erstellt am:	21.01.2006 20:26:04	
Zuletzt geändert am:	02.08.2005 10:05:05	05.03.2004 15:47:38
Kommentar:	F_: Timer Switch Off Delay CRC=14b4/IDB=980d Build S7_S7FFUP_V05.04.0 10:05:04	0.00_03.10.00.01; 2.08.2005

	Preface	Notes	StartUp	Programming
_				





13. Set up a 'New Network' and insert the fault-tolerant FB 216 "F_FDBBACK" (feedback circuit monitoring) from the block container 'F-Application Blocks'. Set up the instance DB, and initialize the inputs and outputs as shown in the figure below. (\rightarrow New network \rightarrow Libraries \rightarrow F-Application Blocks \rightarrow FB216 \rightarrow DB216 \rightarrow Yes)



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!

Notes: If you need the Boolean constants "0" and "1" in your safety program to initialize parameters for block calls, access the variables "RLO0" and "RLO1" in the F-Global DB by means of a fully qualified DB access ("F_GLOBDB".RLO0 or "F_GLOBDB".RLO1). In our example, the F-Global DB has the number "DB 600" in the block container.

The enable input EN and the enable output ENO must not be wired, initialized with "0" or evaluated in the case of fault-tolerant programming!

	Preface	Notes	StartUp	Programming	
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FB 216 Connections

Inputs	Parameter	Data	Description	Default
		Туре		
"Switch_On"	ON	BOOL	Enable conditions for	0
and			Consumer 1/Press	
#ENA_SafetyCircuit				
"HV01-S222"	FEEDBACK	BOOL	Readback input	0
"F00210_4_F_DO_DC24V_2A".Q	QBAD_FIO	BOOL	QBAD signal from F-Periphery	0
BAD			DB of output Q*	
"F_GLOBDB".RLO1	ACK_NEC	BOOL	Fully qualified access to	1
			variable RLO1 from the F-	
			Global DB**	
"HV01-S220"	ACK	BOOL	User acknowledgement (with	0
			button)	
T#1s	FDB_TIME	TIME	Readback time	T#0ms
Outputs	Parameter	Data	Description	Default
		Туре		
"HV01-H100"	Q	BOOL	Consumer 1 / Press	0
	ERROR	BOOL	Readback error	0
	ACK_REQ	BOOL	Acknowledgement request	0
	DIAG	BYTE	Service information	B#16#0

* = in our example, this is the QBAD signal from the F-Periphery DB of the F-DO to which the consumer (the contactors) is connected. The block number of the F-periphery DB is provided by means of the symbolic name in the symbol table, or in the *SIMATIC Manager*.

** = ACKN_NEC: 1 = acknowledgement required

Preface	Notes	StartUp	Programming	



14. Set up the static variable **"HM03"** as auxiliary flag. Insert a **'New Network'** and generate in your safety program for each F-periphery a user acknowledgement for re-integration by means of the variable ACK_REI of the respective F-Periphery DB, as shown in the figure below. Then, save

FB1500. (\rightarrow HM03 \rightarrow New Network \rightarrow **\blacksquare**)





Note: For re-integrating the F-Periphery (that is, for switching from substitute values (0) to process values) after the errors are remedied, a user acknowledgement with a positive edge at the variable ACK_REI of the F-periphery DB is required:

- always after communication errors
- after F-periphery/channel errors only if parameter assignment ACK_NEC = 1.



15. Acknowledge the following message with 'Yes' and then close FB1 and the FBD/LAD Editor. (\rightarrow Yes \rightarrow X)

<u>.</u>	Die Schnittstelle des Bausteins wurde geandert. Nach Speichern führt dies zum Schnittstellenkonflikt mit den Bausteinen, die diesen referenzieren. Die zugehörigen F-Bausteine müssen neu übersetzt werden. Speichern fortsetzen ?
Ja	Nein

Preface	Notes	StartUp	Programming	



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16. Now, open the safety program. (\rightarrow Blocks \rightarrow Options \rightarrow Edit Safety Program)

SIMATIC Manager - [CPU315F	_PROFIsafe F:\\	0_57_Projekte\CPU315F_]	
🞒 Datei Bearbeiten Einfügen Z	ielsystem Ansicht	Extras Fenster Hilfe	X
		Einstellungen Ctrl+Alt+E	· 7 20 50 50 10 10
CPU315F_PROFIsate SIMATIC 300(1) CPU 315F-2 PN/DP CPU 315F-2 PN/DP CPU 315F-2 PN/DP CPU 315F-2 PN/DP CPU 315F-2 PN/DP CPU 315F-2 PN/DP FB1 FB1 FB1 FB1 FB216 FB216 FB216 FB200 FB600 FB600 FB600 FB600 FB600 FB600 FB600 FB206 DB217 DB600 FB601 FB206 FB206 FB206 FB206 FB206 FB206 FB206 FB207 FB600 FB206 FB206 FB206 FB206 FB206 FB206 FB206 FB207 FB600 FB207 FB600 FB600 FB207 FB600 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207 FB206 FB207	Textbibliotheken > Sprache für Anzeigegeräte Texte mehrsprachig verwalten Texte mehrsprachig verwalten > Umverdrahten Ablaufeigenschaften Ablaufeigenschaften Referenzdaten Globaldaten definieren Netz konfigurieren Baugruppen simulieren Prozeßdiagnose projektieren	Größe im Arbeits Typ 	
	➡ DB600 ➡ DB601 ➡ DB602	Sicherheitsprogramm bearbeiten PG/PC-Schnittstelle einstellen	226 Datenbaustein 664 Instanzdatenbaustei 664 Instanzdatenbaustei

17. Then, click on 'F-Sequence Groups'. (\rightarrow F-Sequence Groups)

augruppenträger: 0	Steckplatz: 2					Aktueller Modus
iesemtsignetur eller F.Beusteine m	uit E-Attribut das Baustair	ncontainers:	ME700DC			[nicht bekannt]
esantsignatur des Sicherheitspro	aramme:	icondiners. ;)43720DC			
lutualla Canadanuma	2 D		·			
iktuelle Generierung:	(Sicherheitsbetrieb
as Sicherheitsprogramm wurde se	eit der letzten Generierur	ng geändert.				
-Bausteine:						
F-Ablaufgruppe/F-Baustein	Symb. Name	Funktion im Sicherheitspro	Signatur	Know How S		Vergleichen
🖃 👝 Sicherheitsprogramm						
🖃 – 🛅 Gesamt						Berechtigung
- FB1	FB_HAUPTP	F-FB	DD39			
🛃 FB186		F-Applikationsbaustein	14B4	V		F-Ablauforuppen
🛃 FB216	F_FDBACK	F-Applikationsbaustein	F521	2		
🖅 FB217	F_SFDOOR	F-Applikationsbaustein	86DA	ম		Constituten
🚁 FB600	F_IO_CGP	F-Systembaustein	C554	N		Genellelen
🛃 FB601	F_CTRL_1	F-Systembaustein	EF3F	N		
🚁 FB602	F_CTRL_2	F-Systembaustein	7A69	N		Laden
🕂 DB216		I-DB für F-Applikationsba	C4C8	F		
DB217		I-DB für F-Applikationsba	1F9A			
🛃 DB600	F_GLOBDB	F-Global-DB	D560	V		The second second
DB601	F00200 4 8	E-Perinherie-DB	A540		-	Drucken

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18. Click on 'New', specify a 'New F-Sequence Group' and perform the following settings:
Specify "FC1" as F-call block F-CALL for the new sequence group. This FC is set up

automatically as soon as you exit the dialog field "Edit F-sequence group" with "OK".

• Specify the F-program block for the F-sequence group by selecting from the drop down menu the previously programmed F-FB that you want to specify as F-program block for the F-sequence group; in our example, "FB1".

• Since in our example, the F-program block is a function block, assign an instance DB to it (for example, "DB 1"). This I-DB is set up automatically, as soon as you exit the dialog field "Edit F-sequence groups" with "OK".

• As the maximum cycle time for the F-sequence group, set "200ms".

According to the 2012					200	
Accept with UK .	\rightarrow new \rightarrow	\rightarrow FUI \rightarrow	$rbi \rightarrow$	ν DB I \rightarrow	• ∠uums –>	VN)

Neue F-Ablaufgruppe festlegen	<u>></u>
F-CALL Baustein:	FC1 💌
F-Programmbaustein:	FB1 💌
I-DB für F-Programmbaustein:	DB1
Max. Zykluszeit der F-Ablaufgruppe in ms:	200
DB für F-Ablaufgruppenkommunikation:	🔻



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Notes: The F-CALL is the F-block for calling the F-sequence group from the standard user program. The F-CALL contains the call for the F-program block and the calls for the automatically added Fblocks of the F-sequence group. Although you are setting up the F-CALL, you can not edit it. The F-program block is an F-FC or F-FB (with instance DB) that changes into an F-program block by

- being assigned to the F-CALL. You can do the following in the F-program block:
- Program the safety program with F-FBD or F-LAD
- Call additional F-FBs/F-FCs that were created to structure the safety program
- Insert F-blocks of the block container F-Application Blocks
- Insert F-blocks from "User-generated F-libraries"

Within the F-program blocks, you determine the call sequence of the F-blocks.

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19. After you have confirmed the automatic generation of the missing blocks with 'Yes', return to the dialog field "Edit F-sequence groups", which now looks like the screenshot below. Close it with 'OK'. (\rightarrow Yes \rightarrow OK)

Ablaufgruppe/Parameter	Wert
🗁 Sicherheitsprogramm	
E-C F-Ablaufgruppe FC1	FB1 - 200ms - kein Aufruf gefunden
F-CALL Baustein	? FC1
Symbolischer Name F-CALL Baustein	
🗊 F-Programmbaustein	- 1 FB1
Symbolischer Name F-Programmbaustein	FB_HAUPTPROGRAMM
I-DB für F-Programmbaustein	? DB1
📋 Symbolischer Name I-DB für F-Programmbausteir	n
Max. Zykluszeit der F-Ablaufg	grappo bearbeiten (220:258)
Aufruf F-Ablaufgruppe in	gramm bear beiten (520/250)
📋 Aufrufzeit der F-Ablaufgruppe	en fehlende Bausteine (F-CALL Baustein, I-DB für
📋 Datenbaustein für F-Ablaufgru 🥂 F-Pr	ogrammbaustein, Datenbaustein für
Symbolischer Name DB für F- F-At	olaufgruppenkommunikation) erstellt werden?
Neu Löschen Ja	Nein

20. The safety program is prepared, but not generated yet. The total signature of all F-blocks with the F-attribute of the block container and the total signature of the safety program differ. Now, '**Generate**' your safety program. (\rightarrow Generate)

augruppenträger: 0	Steckplatz: 2					Aktueller Modus:
esamtsignatur aller F-Bausteine mit F	Attribut des Bausteir	ncontainers: §	945728BC			[nicht bekannt]
esamtsignatur des Sicherheitsprogra	mms:	. ()			1.
tuelle Generierung: 💦 🤤)					Sicherheitsbetrieb.
as Sicherheitsprogramm wurde seit o	ler letzten Generierur	ng geändert.				
Bausteine:						
-Ablaufgruppe/F-Baustein	Symb. Name	Funktion im Sicherheitspro	Signatur	Know How S		Vergleichen
3- 🛅 Sicherheitsprogramm						20 - 14
🖽 - 🛅 F-Ablaufgruppe FC1						Berechtigung
🖃 – 🗀 Gesamt				l'anna an th		-
FC1		F-CALL	838E			F-Ablaufgruppen
- FB1	FB_HAUPTP	F-Programmbaustein	DD39			
FB186		F-Applikationsbaustein	14B4	N		Generieren
🛃 FB216	F_FDBACK	F-Applikationsbaustein	F521	V		
🚁 FB217	F_SFDOOR	F-Applikationsbaustein	86DA	Erzeugen eines k	onsister	ten Sicherheitsprogra
FB600	F_IO_CGP	F-Systembaustein	C554	V		Laden
🚁 FB601	F_CTRL_1	F-Systembaustein	EF3F	V		
🖅 FB602	F_CTRL_2	F-Systembaustein	7A69	V		
DB1		I-DB für F-Programmbaus	6A19	V		Developer
- DB216	I.	1-DB für E-Applikationsha	C4C8			Drucken

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21. When the safety program is generated, the consistency of the sequence-relevant F-blocks is checked; that is, the safety program is checked for errors. Possible error messages are read out in an error window. After a successful consistency check, the F-system blocks that are needed in addition are generated automatically, and added to the sequence group, in order to generate a runnable safety program. Now, '**Close**' the message list. (\rightarrow Close)

NUTISISTERZUTUTUTUTUTUTE PODICITUTUDUE POT.	
Konsistenzprüfung für FB1.	
Generieren des Sicherheitsprogramms.	
Ibersetzen des FB217	
Übersetzen des FB216.	
Übersetzen des FC1.	
austeinabgleich des Sicherheitsprogramms.	
rfolgreich generiert am 21.01.2006 20:45:57 mit der F-Compiler-Version V5.4	7 V5.4 (U Warr
(<u>)</u>	
Meldung	
Übersstren des Sieherheitenregromme (220:22)	((ill a barris
Tobersetzen des Sicherheitsprogrammis (320.22)	Hilfetext
Establish annalish an 21 01 2000 20 45 57 and day	
Erroigreich genenert am 21.01.2006 20.45.57 mit der	
IE-L'ompiler-Version V5.4 / V5.4 III Warnunglen II	Rohami
F-Compiler-Version V5.4 / V5.4 (U Warnung[en]).	Gene zu

22. After the generation was successful, a consistent safety program is always in the block container. This safety program consists of all F-blocks with F-attribute. Now, the 'Total signature of all F-blocks with F-attribute of the block container' and the 'Total signature of the safety program' are the same. We now have a consistent safety program and a safety program that is ready for approval. Confirm with 'Close'. (\rightarrow Close)

augruppenträger: 0 esamtsignatur aller F-Bausteine mit esamtsignatur des Sicherheitsprogr stuelle Generierung:	Steckplatz: 2 F-Attribut des Baustein amms: 21.01.2006 20:45:57	icontainers: F F	E8F9CCE E8F9CCE			Aktueller Modus: [nicht bekannt]
as Sicherheitsprogramm ist konsiste Reustaine	ent.					Sichemeitsbetrieb.
F-Ablaufgruppe/F-Baustein	Symb. Name	Funktion im Sicherheitspro	Signatur	Know How S		Vergleichen
3-63 Sicherheitsprogramm						-
⊕- → F-Ablaufgruppe FC1						Berechtigung
🖃 🗁 Gesamt			1			
🖅 - FC1		F-CALL	9382	V	-1	E-Ablaufgruppen
- <mark>7</mark> - FB1	FB_HAUPTP	F-Programmbaustein	980C			
🖅 - FB186	F_TOF	F-Applikationsbaustein	14B4	V		Constiston
🚁 FB216	F_FDBACK	F-Applikationsbaustein	F521	N		Geneneren
FB217	F_SFDOOR	F-Applikationsbaustein	86DA	V		
🖅 - FB600	F_IO_CGP	F-Systembaustein	C554	N		Laden
FB601	F_CTRL_1	F-Systembaustein	EF3F	V		
🖅 FB602	F_CTRL_2	F-Systembaustein	7A69	N		
🖅 FB603	FITOF	F-Systembaustein	69AF	V		1
- FB604	F DIAG N	F-Sustemhaustein	99CA		-	Drucken



23. We enter the safety program by calling the FC1 "F-CALL" from a time interrupt OB. To this end, set up OB35 in the *SIMATIC Manager*. (\rightarrow Blocks \rightarrow Insert New Object \rightarrow Organization Block \rightarrow OB35 \rightarrow OK)

SIMATIC Manager -	[CPU315F_PROFIsafe	F:\0_57_Projekte\CPU	315F_]		<u>_ ×</u>
🛃 Datei Bearbeiten Ei	infügen Zielsystem Ansich	nt Extras Fenster Hilf	e	1. K	_ 8 ×
	BB 🔬 🔍 🐾		< Kein Filter >	· <u> /</u> 20	BBD
E B CPU315F_PROFIS	afe Objektname	Symbolischer Na	ame Erstellsp	orache Größe im Arbeits	Тур 🔺
SIMATIC 300(1	l) 🚵 Systemdaten	673)	577-s)		SDB
E- CPU 315F-	gramm(2)			38	Organisations
- 🕞 Qu	ellen	FB_HAUPTPRC	IGRAMM F-FUP	420	Funktionsbau
Ba Ba	ust	FTOF	F-AWL	294	Funktionsbau
1 August and a second	Kopiorop	Ctrl+X	FFUP	332	Funktionsbau
	Finfüren	CELLEV		340	Funktionsbau
		CUITY	F-AWL F-AWI	9574	Funktionsbau
	Löschen	Del	F-AWL	5300	Funktionsbau
	Neues Objekt einfüge	n X	Organisationshauste	in 1092	Funktionshau
	Zielsystem		Funktionsbaustein	984	Funktionsbau
		2	Funktion	746	Funktionsbau
	Umverdrahten		Datenbaustein	738	Funktionsbau
	Bausteine vergleichen	h	Datentyp	532	Funktionsbau
	Rererenzaaten Reusteinkonsistena pr	Üfen	Variablentabelle	370	Funktion
		<u>dien</u>	F-DB	38	Instanzdatent
	Drucken	•	F-DB	70	Instanzdatent
	Umbenennen	F2	F-DB	42	Instanzdatent
	Obiekteigenschaften.	Alt+Return	F-DB	266	Datenbausteii 💌
J Füht Organisationshaustein	Spezielle Objekteigen:	schaften 🕨			
Figenschaften Organisat	tionshaustain		v I		
Allgemein - Teil1		Ì			
			1		
Name:	10835	_			
Symbolischer Name:					
Symbolkommentar:	J				
Erstellsprache:	FUP		121		
Projektpfad:	CPU315F_PROFIsafe\SIMA1 PN/DP\S7-Programm(2)\Bau	FIC 300(1)\CPU 315F-2 isteine\0B35			
Speicherort des Projekts:	F:\0_S7_Projekte\CPU315F_	-			
	Code	Schnittstelle			
Erstellt am:	21.01.2006 20:51:40				
Zuletzt geändert am:	21.01.2006 20:51:40	21.01.2006 20:51:40)		
Kommentar:			*		
			-		
OK		Abbrechen	Hilfe		

1

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Note: Time interrupt OBs have the following advantage: they interrupt cyclical program processing in OB1 of the standard user program at fixed time intervals. That means, in a time interrupt OB, the safety program is called and run in fixed time intervals. After the safety program is processed, the standard user program continues to be processed.

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24. Open 'OB35' by double clicking in the SIMATIC Manager. (\rightarrow OB35)

SIMATIC Manager - [CPU315F_I	PROFIsafe F:\0_57_P	rojekte\CPU315F_]			_ 🗆 ×
🎒 Datei Bearbeiten Einfügen Ziel	system Ansicht Extras	Fenster Hilfe			_ 8 ×
D 🗃 📰 📰 👪 🖬 🖬	1 9 2 <u>1 1</u>	📰 🏦 主 🛛 🕻 Kein Filter	> <u>•</u>	<u>v 20 5</u>	
🖃 🎒 CPU315F_PROFIsafe	Objektname	Symbolischer Name	Erstellsprache	Größe im Arbeits	Тур 🔺
🖻 🎆 SIMATIC 300(1)	🚵 Systemdaten	1000 - 100 -			SDB
🖻 - 📓 CPU 315F-2 PN/DP	🕞 0B1			38	Organisationsba
⊡ 🛐 S7-Programm(2)	OB35	CYC_INT	FUP	38	Organisationsba
	🕞 FB1	FB_HAUPTPROGRAMM	F-FUP	420	Funktionsbauste
	5 FB186	F_TOF	F-AWL	294	Funktionsbauste
	5 FB216	F_FDBACK	F-FUP	332	Funktionsbauste
	5 FB217	F_SFDOOR	F-FUP	340	Funktionsbauste
	500 FB600	F_IO_CGP	F-AWL	15252	Funktionsbauste
	501 FB601	F_CTRL_1	F-AWL	9574	Funktionsbauste
	502 FB602	F_CTRL_2	F-AWL	5300	Funktionsbauste
	503 FB603	FITOF	F-AWL	1092	Funktionsbauste
	504 FB604	F_DIAG_N	F-AWL	984	Funktionsbauste
	5 FB605		F-AWL	746	Funktionsbauste
	506 FB606		F-AWL	738	Funktionsbauste
	5607 FB607		F-AWL	532	Funktionsbauste
	FC1		F-CALL	370	Funktion
	🔁 DB1		F-DB	38	Instanzdatenbai
	🗗 DB216		F-DB	70	Instanzdatenbai
	DB217		F-DB	42	Instanzdatenbal 💌
Drücken Sie F1, um Hilfe zu erhalten.	1.1	PC Adapte	r(PROFIBUS)	38 Bytes	

25. Call FC1 "F-CALL" in the time interrupt OB 35 as shown in the figure. Save and close OB35.

$(\rightarrow$ Call FC 1 \rightarrow	$\blacksquare \to \mathbf{X})$	
--	--------------------------------	--

KOP/AWL/FUP - [0835 "CYC_INT" CPU315F_PR0FIsafe\SIMATIC 300(1)\CPU 31	5F-2 PN/DP\\0B35]
🔁 Datei Bearbeiten Einfügen Zielsystem Test Ansicht Extras Fenster Hilfe	
OB35 : "Cyclic Interupt" FC1 EN	Sprünge Sprünge Sprünge Siekpunkt-Fkt. Siekpunkt-
BLOCK FC Image: State of the state of	SFC Bausteine Multinstanzen F30001 / FCLB0001 ED Programmel E Aufrufstruk Abs < 5.2

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26. Open 'OB1' with a double click in the SIMATIC Manager and select 'FBD' as 'Programming Language'. (\rightarrow OB1 \rightarrow FBD \rightarrow OK)

SIMATIC Manager - [[CPU315F_F	ROFIsafe F	:\0_57_Projek	te\CPU315	iF_]					_ 🗆 ×
🞒 Datei Bearbeiten Eir	nfügen Ziel:	system Ansich	t Extras Fens	ter Hilfe						_ 8 ×
		10 <u>-</u>	<u>D</u> <u>b-</u> <u>b-b-</u>	iii 🖻 [< Kein Filter :	×	• 70	22		
CPU315F_PROFIsa	afe	Objektname	Sym	bolischer Na	me	Erstellsprache	Größe	im Arbeits	Тур	
SIMATIC 300(1)	🚵 Systemdat	en			1			SDB	
	Z PN/DP zramm(2)	🕮 0B1						38	Organisa	tionsba
Bar Shirles	ellen	CB35	CYC	:_INT	220283	FUP		54	Organisa	tionsba
Bau Bau	usteine	FB1	FB_	HAUPTPRO	GRAMM	F-FUP		420	Funktion:	sbauste
1000		E FB186	F_1			FAWE		294	Funktion	sbauste
		EP216	r_r _ c e	DBACK				332	Funktion	spauste
			г_э Е (г	1 CGP		F-FUF F-AWI		15252	Funktion:	sbauste obauete
		5 FB601	1_10 F_0	TBL 1		F-6\1/1		9574	Funktion	sbauste
		EB602	F C	TBL 2		F-AWI		5300	Eunktion:	shauste
		FB603	FITO)F		F-AWL		1092	Funktion:	sbauste
		5 FB604	F D	AG N		F-AWL		984	Funktion:	sbauste
		FB605				F-AWL		746	Funktion	sbauste
		53 FB606				F-AWL		738	Funktion	sbauste
		5 FB607				F-AWL		532	Funktion:	sbauste
		FC1				F-CALL		370	Funktion	
		🔂 DB1				F-DB		38	Instanzda	atenbai
		DB216				F-DB		70	Instanzda	atenbai
		DB217				F-DB		42	Instanzda	atenbal 💌
J										
Drücken Sie F1, um Hilfe zu e	erhalten.				PC Adapter	(PROFIBUS)		38 Byte:	S	1
Eigenschaften - Organisa	tionsbaust	ein			2	K				
Allgemein - Teil 1 Allgeme	ein - Teil 2 A	ufrufe Attribut	•]							
Name:	081									
Symbolischer Name:		1								
Symbolkommentar:										
Erstellsprache:	FUP	•								
Projektpfad:										
Speicherort des Projekts:	F:\0_\$7_P	ojekte\CPU315	F							
	Code		Schnittst	elle						
Erstellt am:	17.01.2006	14:33:11								
Zuletzt geändert am:	17.01.2006	14:33:11	17.01.20	06 14:33:11						
Kommentar:					-					
					-					
					<u></u>					
ОК			Abl	orechen	Hilfe	1				

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27. Program the activation of flag M10.0 for the operational enable of the press from the standard

program. Save and close OB1. (\rightarrow \blacksquare \rightarrow \checkmark)

KOP/AWL/FUP - FOB1 CPU315F_PROFIsafe\SIMATIC 300(1)\CF	9U 315F-2 PN/DP]	
Datei Bearbeiten Einfügen Zielsystem Test Ansicht Extras Fens	ster Hilfe	X
	6 14 14 14 14 14 14 14 14 14 14 14 14 14	
Inhalt von: 'Umgebung\Schnitts	telle'	X X
X X X X X X X X X X X X X X	4: Operandeninfo	n À 6: Diagnose À 7: Vergleich
Drücken Sie F1, um Hilfe zu erhalten.	🗣 offline 🛛 Abs <	5.2 Einfg

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28. Switch the interface for loading the safety program to PROFIBUS. (\rightarrow Options \rightarrow Set PG/PC interface \rightarrow PC-Adapter (PROFIBUS) \rightarrow Settings \rightarrow OK \rightarrow OK)

🛃 SIMATIC Manager - [CPU315F_	PROFIsafe F:\()_57_Projekte\CPU315F_]			_ 🗆 🗙
🞒 Datei Bearbeiten Einfügen Zie	elsystem Ansicht	Extras Fenster Hilfe			_ & ×
	🔬 🖸 📲 🖻	Einstellungen Cl	trl+Alt+E	· V 28 00 1	
☐-∰ CPU315F_PROFIsafe ☐-∰ SIMATIC 300(1) ☐-∰ CPU 315F-2 PN/DP	Objektname	Textbibliotheken Sprache für Anzeigegeräte… Texte mehrsprachig verwalten	+	e Größe im Arbeits 42	Typ SDB Organisationsba
E Sr-Programm(2)	OB35 FB1 FB1	Umverdrahten Ablaufeigenschaften		54 420 294 332 340 15252 9574 5300 1092 984 746	Organisationsba Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste
	⇒ FB186 ⇒ FB216 ⇒ FB217 ⇒ FB600 ⇒ FB601 ⇒ FB602 ⇒ FB603 ⇒ FB603 ⇒ FB604 ⇒ FB605	Bausteine vergleichen Referenzdaten Globaldaten definieren Netz konfigurieren	•		
		Baugruppen simulieren Prozeßdiagnose projektieren			
		Sicherheitsprogramm bearbeiten			
2 2	500 FB606 500 FB607 · ·	PG/PC-Schnittstelle einstellen	738 532	Funktionsbauste Funktionsbauste	
	FC1		F-CALL	370	Funktion
	DB1		F-DB	38	Instanzdatenbai
	DB216		F-DB	70	Instanzdatenba
	JB217		F-DR	42	Instanzdatenbal 💌

Bearbeitet Schnittstellen und Geräte-Parametrierungen und ordnet sie einander zu.

ugriffsweg	PROFIBUS Lokaler Anschluß	
Zugangspunkt der Applikation: S7ONLINE (STEP:7)> PC Adapter(PROFIBUS) Standard für STEP 7) Constate Schwitztellene scarsetrierung:	Stationsbezogen G/PC ist einziger Master am B Adresse:	us O 🔭
PC Adapter(PROFIBUS) Eigenschaften	Timeout:	30 s 💌
Image: PC Adapter(PPI) ▲ Image: PC Adapter(PR0FIBUS) Kopieren Image: PC Adapter(PR0FIBUS) Löschen Image: PC Adapter PC Adapters für ein Löschen PR0FIBUS-Netz) PR0FIBUS-Netz)	Netzbezogen Übertragungsgeschwindigkeit: Höchste Teilnehmeradresse: Profil:	1.5 Mbit/s 126 DP Standard Universell (DP/FMS) Benutzerdefiniert
Schnittstellen		Busparameter
Hinzutugen/Entfernen: Auswählen OK Abbrechen	Netzkonfiguration	Joksichtigen es: 0 😤

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29. Open the safety program again. (\rightarrow Blocks \rightarrow Options \rightarrow Edit safety program)

SIMATIC Manager - [CPU315F_PROFIsafe	:\0_S7_Projekte\CPU315F_]		
🗿 Datei Bearbeiten Einfügen Zielsystem Ansich	t Extras Fenster Hilfe		_ 8 ×
D 🚅 🎛 🛲 🗴 🖻 🖻 🏜 🔍 🐾	Einstellungen Ctrl+Alt+E	🖸 7/ 12 00 5	
CPU315F_PR0FIsafe SIMATIC 300(1) CPU 315F-2 PN/DP S7-Programm(2) OB1 OB35 OB35 OB35 DB1 OB35 OB35 OB1	Textbibliotheken	ne Größe im Arbeits Typ SDI 42 Org 54 Org 420 Fun 420 Fun	3 anisationsba anisationsba aktionsbauste
Entrop Bausteine ☐ FB186 ☐ FB216 ☐ FB217 ☐ FB600 ☐ FB601	Bausteine vergleichen Referenzdaten Globaldaten definieren Netz konfigurieren	294 Fun 332 Fun 340 Fun 15252 Fun 9574 Fun	Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste Funktionsbauste
FB602	Baugruppen simulieren Prozeßdiagnose projektieren	5300 Fun 1092 Fun	iktionsbauste iktionsbauste
동국 FB604 동국 FB605 동국 FB606	Sicherheitsprogramm bearbeiten PG/PC-Schnittstelle einstellen	984 Fun 746 Fun 738 Fun	Funktionsbauste Funktionsbauste Funktionsbauste
5607	- FAWL	532 Fun	iktionsbauste
FC1	F-CALL	370 Fun	iktion
DB1	F-DB	38 Inst	anzdatenbai
51 DB216 51 DB217	F-DB F-DB	70 Inst 42 Inst	anzdatenbai anzdatenbai

30. Click on the button 'Load'. (\rightarrow Load)

augruppenträger: 0 S	Steckplatz: 2					Aktueller Modus:
esamtsignatur aller F-Bausteine mit F esamtsignatur des Sicherheitsprogra	-Attribut des Baustei mms:	ncontainers: F F	E8F9CCE E8F9CCE			[nicht bekannt]
ktuelle Generierung: 2	1.01.2006 20:45:57					Sicherheitsbetrieb
as Sicherheitsprogramm ist konsister	it.					
Bausteine:						
F-Ablaufgruppe/F-Baustein	Symb. Name	Funktion im Sicherheitspro	Signatur	Know How S		Vergleichen
∃-🧀 Sicherheitsprogramm						
⊕- F-Ablaufgruppe FC1						Berechtigung
🖃 🗀 Gesamt		2	9 			
🖅 FC1		F-CALL	9382			F-Ablaufgruppen.
± <mark>7</mark> 7 FB1	FB_HAUPTP	F-Programmbaustein	980C			
🚁 FB186	F_TOF	F-Applikationsbaustein	14B4	ম		Generieren
🚁 FB216	F_FDBACK	F-Applikationsbaustein	F521	N		Genellelen
🛃 FB217	F_SFDOOR	F-Applikationsbaustein	86DA	V		1
🚁 FB600	F_IO_CGP	F-Systembaustein	C554	V		Laden
🖅 FB601	F_CTRL_1	F-Systembaustein	EF3F	Laden des	Sicherb	eitsprogramms in die l
FB602	F_CTRL_2	F-Systembaustein	7A69			sicsprogramms in die i
🖅 - FB603	FITOF	F-Systembaustein	69AF	V		1
	F DIAG N	F-Sustemhaustein	99CA			Drucken

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31. Confirm the query whether the F-CPU is to be switched to the operating mode STOP with 'Yes'. $(\rightarrow$ Yes)



32. Confirm the query whether the standard blocks are also to be loaded with 'Yes'. (\rightarrow Yes)

Laden de	s Sicherheitsprogramms (32)	0:127) 🗶
<u>.</u>	Sollen bei diesem Ladevorgang befindlichen Standard-Baustein Systemdatenbausteine) mitgelar	die im Bausteinordner e (ausgenommen den werden ?
🗖 Dies	e Meldung in Zukunft nicht mehr a	nzeigen.
Ja	a Nein	Abbrechen

33. Enter the password. (\rightarrow pw_fcpu \rightarrow OK)

Die Baugruppe. mit einem Paßw	/Memory Card CPU 315F ort geschützt.	-2 PN/DP ist
Paßwort:	*****	
Paßwort als Baugrupper	Vorgabe für weitere ges n/Memory Cards verwend	chützte Jen

34. Confirm the query whether the CPU is to be started with 'Yes'. (\rightarrow Yes)

Laden de	s Sicherheitsprogramms (320:163)				
<u>.</u>	Die F-CPU befindet sich im Zustand STOP. Soll die F-CPU jetzt gestartet werden?				
Ja	Nein				

i

Notes: If you only load the F-blocks, the block in which the F-CALL block is called (in our example, time interrupt OB35) will not be loaded. You will have to load this OB separately, as in the standard program.

The complete safety program can only be loaded in the STOP mode.

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35. In the dialog field '**Safety program**', activate successively the optional buttons '**Offline**' and '**Online**' and check whether the total signatures of all F-blocks with F-attribute of the block container match online and offline. If they match, loading the safety program was successful. If not, repeat the load process. (\rightarrow Online \rightarrow Offline \rightarrow Close)

ugruppenträ <mark>Zeigt die</mark> samtsignatur aller F-E samtsignatur des Sic	Online-Bausteine des Siche Bausteine mit F-Attribut des E herheitsprogramms:	erheitsprogramms an Bausteincontainers: FE8F9CCE FE8F9CCE	1	Aktueller Modu Aktiviert
tuelle Generierung: s Sicherheitsprogram lausteine:	21.01.2006 20 m ist konsistent.	:45:57		Sicherheitsbetrie
-Baustein	Symb. Name	Funktion im Sicherheitsprogramm	Signatur	Vergleichen
17 FB1		F-Programmbaustein	980C	
🖅 FB186		F-Applikationsbaustein	14B4	Berechtigung
🖅 FB216		F-Applikationsbaustein	F521	
률 FB217		F-Applikationsbaustein	86DA	E-Ableuforuppe
FB600		F-Systembaustein	C554	
🖅 FB601		F-Systembaustein	EF3F	
FB602	8	F-Systembaustein	7A69	Generieren
FB603		F-Systembaustein	69AF	
FB604		F-Systembaustein	99CA	Laden
7 FB605		automatisch generierter F-Baustein	AC39	
🚁 FB606		automatisch generierter F-Baustein	293A	
🖅 FB607		automatisch generierter F-Baustein	4B0E	
EC1		F-CALL	9382	Drucken

36. To activate the safety mode, perform a STOP/RUN transition of the F-CPU.



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Note: After a safety program is generated, you have to perform a complete function test according to your automation task.

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