



Annex 1 of the Report  
on the  
Certificate

Z2 03 04 38282 002

Safety-Related Programmable Systems  
SIMATIC S7 F/FH Systems  
(formerly SIMATIC S7-400F and S7-400FH)

Manufacturer:

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Testing Body:

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## Revision Log

Version	Name	Date	Changes/History
1.0	P. Müller	27.02.2002	Initial
1.2	P. Müller	18.09.2001	Seperator module has been added Version of Option Package S7 F Systems Version of F_R_R Version of F_R_BO Version of F_CH_AI
1.3	P. Müller	15.11.2001	Section 2.2, comment has been added
1.4	P. Müller	08.02.2002	Version of Option Package S7 F Systems Version of F_F_TRIG Version of F_R_TRIG Version of F-SM added
1.5	A. Beer	22.07.2002	Integration of a Revision Log Version of SM 326 DO 10xDC24V/2A Version of SM 326 DI 24xDC24V
1.6	A. Beer	02.12.2002	Firmware version of SM 326 DO 10xDC24V/2A
1.7	A. Beer	25.04.2003	4/8 F-DI DC24V, 4 F-DO DC24V/2A, PM-E F D24V, PM-D F D24V added Section 2.2 deleted Table of section 1 New software versions added
1.8	A. Beer	13.10.2003	Certification number, Version of SM 326, DO 10 x DC24V/2A deleted
1.9	A. Beer	25.11.2003	Version of SM 326, DO 10 x DC24V/2A added
2.0	A. Beer	03.03.2004	Added new CPU FW version with EDC RAM option; added new Version of SM 326, DO 10 x DC24V/2A.
2.1	A. Beer	16.12.2004	Added new ET200S modules for use in S7 F/FH: 6ES7 148-3FA00-0XB0 6ES7 138-4CF01-0AB0 6ES7 138-4CF40-0AB0 Added new FB for V5.2, SP1 in section 2.1.3; Added signature changes for FB for V5.2, Sp1 in section 2.1.4
2.2	A. Beer	28.02.2005	4/8 F-DI DC24V, 4 F-DO DC24V/2A, SM 326, DO 8 x DC24V/2A, CPU 417-4H and CPU 414-4H added
2.3	F. Rauch	30.06.2005	Added new F-FBs for V5.2 SP2 (Safety Data Write) in section 2.1.5

## Safety-Certified and Interference-Free Components.

### 1 Hardware and Firmware Components

The following system components are certified 'safety-related'. This allows the components to be used to process safety critical signals and functions:

Module	Order Number	Release Number	Module Description
CPU 417-4H	6ES7 417-4HL01-0AB0	1 or higher	CPU which is suitable for safety-related applications by using a fail-safe-application program.
CPU 417-4H	6ES7 417-4HL04-0AB0 <sup>1</sup>	1 or higher	
CPU 414-4H	6ES7 414-4HJ00-0AB0	1 or higher	
CPU 414-4H	6ES7 414-4HJ04-0AB0 <sup>1</sup>	1 or higher	
SM 326, DI 24 x DC24V	6ES7 326-1BK00-0AB0	01 to 06	24 channel digital input module 24VDC
SM 326, DI 8 x NAMUR	6ES7 326-1RF00-0AB0	01 to 05	8 channel NAMUR digital input module for intrinsically-safe sensors
SM 326, DO 10 x DC24V/2A	6ES7 326-2BF00-0AB0	01 to 03, 07	10 channel digital output module 24VDC, P-switch
SM 326, DO 10 x DC24V/2A	6ES7 326-2BF01-0AB0	01 to 03	10 channel digital output module 24VDC, P-switch

<sup>1</sup> Unlike the values given in earlier versions of the user manuals the *average probability of failure on demand* is 1,88E-04 and the *probability of a dangerous failure per hour* is 4,29E-09



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Module	Order Number	Release Number	Module Description
SM 326, DO 8 x DC24V/2A	6ES7 326-2BF40- 0AB0	01	8 channel digital output module 24VDC, P/M-switch
SM 336, AI 6 x 13 Bit	6ES7 336-1HE00- 0AB0	01 to 04	6 channel analog input module
Safety Protector	6ES7 195-7KF00- 0XA0	01 to 03	protects the fail-safe signal modules from possible overvoltage
4/8 F-DI DC24V	6ES7 138-4FA00- 0AB0	01 to 03	4/8 channel digital input module 24VDC
4/8 F-DI DC24V	6ES7 138-4FA01- 0AB0	01	4/8 channel digital input module 24VDC
4/8 F-DI DC24V eco	6ES7 148-3FA00- 0XB0	01 to 02	4/8 channel digital input module 24VDC ET200eco version
4 F-DO DC24V/2A	6ES7 138-4FB00- 0AB0	01 to 03	4 channel digital output module 24VDC/2A; P/M switch
4 F-DO DC24V/2A	6ES7 138-4FB01- 0AB0	01	4 channel digital output module 24VDC/2A; P/M switch
PM-E F DC24V	6ES7 138-4CF00- 0AB0	01 to 04	Power module 24VDC; P/M switch
PM-E F DC24V	6ES7 138-4CF01- 0AB0	01	Power module 24VDC; P/M switch
PM-E F DC24V	6ES7 138-4CF40- 0AB0	01 to 02	Power module 24VDC; P/P switch
PM-D F D24V	3RK1 903- 3BA00	04	Power module for failsafe motor starters

All other components of the S7-400 and S7-300 family are 'interference-free' ('rückwirkungsfrei') and allowed to be used, however, they are not certified for process safety critical signals and functions. Using these components does not interfere with the proper functioning of the safety-related modules.

For details on architectural, configuration and implementation requirements please refer to the Siemens manuals of the SIMATIC S7 F/FH Systems documentation package.

## 2 Safety-Relevant Software Components

### 2.1 Option Package S7 F Systems

Section 2.1.1	V5.2 +SPn +HFm (V is mandatory, SPn, HFm are optional)
Section 2.1.2	V5.1 +SPn +HFm (V is mandatory, SPn, HFm are optional)

SP = Service Pack  
HF = Hot Fix

#### 2.1.1 F-Library V1\_2

The Option Package S7 F Systems V5.2 includes the following F-FBs with version number 3.0.

F-FB	Function	Signature	Initial Value Signature
DB_RES	DB Reset After Coldstart	2D14	D8AA
F_2OUT3	2 OUT OF 3 Binary selection	34DE	D79F
F_1002_R	1 OUT OF 2 Real selection	D100	6717
F_2003_R	2 OUT OF 3 Real selection	FC09	3D43
F_ABS_R	REAL-Absolute Value	7E9D	4885
F_ADD_R	Addition of two REAL	B495	B1DF
F_AND4	AND 4 Inputs	89B0	6837
F_AVEX_R	Average of nine REAL	BE40	1CB3
F_BO_FBO	BOOL to F_BOOL Converter	27AB	87DA
F_CH_AI	Analog Input	8F67	D784
F_CH_DI	Digital Input	2346	F504
F_CH_DO	Digital Output	E0B9	D7F0
F_CTUD	Up/Down Counter	EF97	F7D1
F_CYC_CO	Cycle Control	E895	6769
F_DIV_R	Division of two REAL	D7A8	C0B8
F_F_TRIG	Recognition of falling Edge	75E7	8F11
F_I_FI	INT to F_INT Converter	4871	87DA



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F_LIM_HL	Limit Monitoring high Level	5116	7656
F_LIM_I	INT-Limiter	0B0C	F4F9
F_LIM_LL	Limit Monitoring low Level	AF69	7656
F_LIM_R	REAL-Limiter	4017	B4BE
F_LIM_TI	TIME-Limiter	3ABB	7CAB
F_M_AI6	Module Driver Analog Input 6	AF64	EC0D
F_M_DI24	Module Driver Digital Input 24	EB16	1FE2
F_M_DI8	Module Driver Digital Input 8	8FA4	9D22
F_M_DO10	Module Driver Digital Output 10	22E8	EB44
F_M_DO8	Module Driver Digital Output 8	7337	3B1F
F_MAX3_R	Maximum of three REAL	78DB	5833
F_MID3_R	Middle of three REAL	D596	6ACF
F_MIN3_R	Minimum of three REAL	551B	2950
F_MUL_R	Multiplication of two REAL	36DC	B1DF
F_MUX2_R	Multiplexer of two REAL	7DE0	5B43
F_NOT	Inverter	9CD8	DD06
F_OR4	OR 4 Inputs	5DCA	6B42
F_PLK	Program Run Control before Output	A234	5FA0
F_PLK_O	Program Run Control after Output	D690	834C
F_QUITES	Acknowledgement from ES/OS	B433	B027
F_R_BO	Receive BOOL from another Run-time	6CE1	B9A5
F_R_FR	REAL to F_REAL Converter	4278	6BCE
F_R_R	Receive REAL from another Run-time group	64A1	543A
F_R_TRIG	Recognition of rising Edge	BFC8	8F11
F_RCVBO	Receive BOOL from another CPU	A2B9	DCF4
F_RCVR	Receive REAL from another CPU	B854	14C1
F_RS_FF	RS-Flipflop	3A1A	069A
F_S_BO	Send BOOL to another Run-Time group	F353	1110
F_S_R	Send REAL to another Run-Time group	372C	1FC2
F_SENDBO	Send BOOL to another CPU	E223	F3D1
F_SENDR	Send REAL to another CPU	7B16	5B9D
F_SMP_AV	Sliding average	9D24	9CDF
F_SQRT	Square Root Extraction	593F	CDD8
F_SR_FF	SR-Flipflop	61BC	069A
F_START	Coldstart Identification	5791	2151
F_SUB_R	Subtraction of two REAL	5C35	B1DF
F_TEST	Self Test Block of Commands	5B6D	38AF
F_TESTC	Control Block for Background Test	5A93	D8AA
F_TESTM	Switch on testmode	2983	BED2
F_TI_FTI	TIME to F_TIME Converter	A06D	6BCE

F_TOF	Timer Switch Off Delay	31A9	7CFC
F_TON	Timer Switch On Delay	F8E5	7CFC
F_TP	Timer Impulse	64DD	7CFC
F_XOR2	EXOR 2 Inputs	6D4D	069A
F_XOUTY	X OUT OF Y Binary selection	6A1C	C51D

### Attention!

**Contrary to the Siemens S7 user's manual the F\_FR\_FI function block is NOT certified for safety applications and shall NOT be used to process safety critical data.**

### New Blocks added to the F-Library (V1\_2) with no signatures

F-FB	Function	Signature	Initial Value
DB_INIT	Initialize F- Run-Time Groups at the direction of the F_SHUTDN block	N/A	N/A
F_SHUTDN	Shutdown Logic	N/A	N/A
FAIL_MSG	Interface to Failsafe Messages	N/A	N/A
RTG_LOGI C	Interface the F-Run-Time Groups to the Shutdown Logic	N/A	N/A

### 2.1.2 F-Library V1\_1

The Option Package S7 F Systems V5.1 includes the following F-FBs with version number 2.0 or 2.1 (for F-FB's with a second signature marked with " \*\* ").

F-FB	Function	Signature	Initial Value Signature
F_2OUT3	2 OUT OF 3 Binary selection	34DE	D79F
F_ABS_R	REAL-Absolute Value	7E9D	4885
F_ADD_R	Addition of two REAL	643F	206C
F_AND4	AND 4 Inputs	89B0	6837
F_AVEX_R	Average of nine REAL	9926	8CE8
F_BO_FBO	BOOL to F_BOOL Converter	27AB	87DA
F_CH_AI**	Analog Input	296D	C540



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F-FB	Function	Signature	Initial Value Signature
		or AA4F	or C540
F_CH_DI	Digital Input	E41B	F504
F_CH_DO	Digital Output	6E6A	18CF
F_CTUD	Up/Down Counter	9928	F7D1
F_CYC_CO	Cycle Control	3263	CB5D
F_DIV_R	Division of two REAL	9CF2	4A67
F_F_TRIG**	Recognition of falling Edge	75E7	2000 <sup>OBS</sup> or 8F11 <sup>HF1</sup>
F_I_FI	INT to F_INT Converter	4871	87DA
F_LIM_HL	Limit Monitoring high Level	435E	CB3F
F_LIM_I	INT-Limiter	5219	F4F9
F_LIM_LL	Limit Monitoring low Level	FB73	CB3F
F_LIM_R	REAL-Limiter	C92F	0A10
F_LIM_TI	TIME-Limiter	13A0	7CAB
F_M_AI6	Module Driver Analog Input 6	3CC4	75CF
F_M_DI24	Module Driver Digital Input 24	7DA1	0D91
F_M_DI8	Module Driver Digital Input 8	4996	640D
F_M_DO10	Module Driver Digital Output 10	A89E	EE4E
F_MAX3_R	Maximum of three REAL	AEA9	9A67
F_MID3_R	Middle of three REAL	5422	6A94
F_MIN3_R	Minimum of three REAL	A524	31E1
F_MUL_R	Multiplication of two REAL	B7AC	206C
F_MUX2_R	Multiplexer of two REAL	5911	5B43
F_NOT	Inverter	9CD8	DD06
F_OR4	OR 4 Inputs	5DCA	6B42
F_PLK	Program Run Control before Output	E5B4	D2F9



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<b>F-FB</b>	<b>Function</b>	<b>Signature</b>	<b>Initial Value Signature</b>
F_PLK_O	Program Run Control after Output	53BE	3E43
F_QUITES	Acknowledgement from ES/OS	89EC	B027
F_R_BO**	Receive BOOL from another Run-time group	3E82 or D775	B9A5 or B9A5
F_R_FR	REAL to F_REAL Converter	6ED3	6BCE
F_R_R**	Receive REAL from another Run-time group	6C69 or 6F8F	543A or 543A
F_R_TRIG* *	Recognition of rising Edge	3E5E	2000 <sup>obs</sup> or 8F11 <sup>HF1</sup>
F_RCVBO	Receive BOOL from another CPU	6FFB	DCF4
F_RCVR	Receive REAL from another CPU	F6F3	14C1
F_RS_FF	RS-Flipflop	5A81	069A
F_S_BO	Send BOOL to another Run-Time group	CC75	1110
F_S_R	Send REAL to another Run-Time group	D897	1FC2
F_SENDBO	Send BOOL to another CPU	B204	F3D1
F_SENDR	Send REAL to another CPU	3BA4	5B9D
F_SMP_AV	Sliding average	FB42	5B98
F_SQRT	Square Root Extraction	C412	895D
F_SR_FF	SR-Flipflop	7F12	069A
F_START	Coldstart Identification	5791	2151
F_SUB_R	Subtraction of two REAL	46B5	206C
F_TEST	Self Test Block of Commands	D774	A04B
F_TESTC	Control Block for Background Test	E7E8	711C
F_TESTM	Switch on testmode	2983	BED2
F_TI_FTI	TIME to F_TIME Converter	A06D	6BCE

<b>F-FB</b>	<b>Function</b>	<b>Signature</b>	<b>Initial Value Signature</b>
F_TOF	Timer Switch Off Delay	F899	7CFC
F_TON	Timer Switch On Delay	DD31	7CFC
F_TP	Timer Impulse	D608	7CFC
F_XOR2	EXOR 2 Inputs	6D4D	069A
F_XOUTY	X OUT OF Y Binary selection	5F86	C51D
F_IN_D24 <sup>*)</sup>	Binary Input Driver 24 Channels	903C	7A60
F_IN_D8 <sup>*)</sup>	Binary Input Driver 8 Channels	CCCF	6A81
F_OU_D10 <sup>*)</sup>	Binary Output Driver 10 Channels	E93D	9FED

<sup>\*)</sup> These F-FBs are not included in Option Package S7 F Systems V5.1. They are delivered to customers of Option Package S7 F Systems V5.0 on request.

**\*\*)** The certified F-FB has two valid signatures.

obs) These F-FBs are included in Option Package S7 F Systems V5.1. They may cause a wrong overall signature and problems starting the CPU. Thus it is recommended to use the FBs delivered with the V5.1+SP1+HF1.

HF1) These F-FBs are included in Option Package S7 F Systems V5.1+SP1+HF1. It is delivered to customers of Option Package S7F Systems V5.1 on request.

The Option Package S7 F Systems V5.1 may be used together with F-FBs with version number 1.0 of Option Package S7 F Systems V5.0 listed in Revision 1.0 of this Annex. However mixing of version 1.0 and version 2.0 F-FBs in the same program is not possible.

### 2.1.3 New FB added in SP1 for F-Library V1\_2

<b>F-FB</b>	<b>Function</b>	<b>Signature</b>	<b>Initial Value</b>
F_FI_FR	Convert F_INT to F_REAL	672A	9FDE
F_PSG_M	Partial Shutdown Group Marker Block	N/A	N/A

#### 2.1.4 Changed FB in SP1 for F-Library V1\_2

F-FB	Function	Signature	Initial Value
F_CH_DI	Digital Input	A47F	EC21
F_CH_AI	Analog Output	741E	8D4B
F_CH_DO	Digital Output	92C1	DA68
F_M_DO8	Module Driver Digital Output 8	86EF	BD24
F_M_DO10	Module Driver Digital Output 10	6CA7	4A6E
F_M_DI24	Module Driver Digital Input 24	F887	2EAC
F_M_DI8	Module Driver Digital Input 8	5078	94DC
F_M_AI6	Module Driver Analog Input 6	1E41	D818
F_SHUTDN	Shutdown Logic	N/A	N/A

#### 2.1.5 New FB added in SP2 for F-Library V1\_2

F-FB	Function	Signature	Initial Value
F_CHG_R	CHANGE F-PARAMETER „REAL“ FROM OS	E4CD	5DB5
F_CHG_BO	CHANGE F-PARAMETER „BOOL“ FROM OS	D042	E5F2
F_CHG_WS	F_CONTROL BLOCK	N/A	N/A

### 3 Non-Safety Relevant Software Components

Option Package S7 F Systems V5.0 is no longer supported.

#### 3.1 F-Library V1\_1

S7 F Systems V5.1 and V5.2 in combination with Failsafe Blocks (V1\_1) library

Function	Version
CPU Firmware	V2.1.x (CPU with order number 6ES7 417-4HL01-0AB0 and 6ES7 414-4HJ00-0AB0)  Where x=0 or higher  V3.1.x (CPU with order number 6ES7 417-4HL01-0AB0 and 6ES7 414-4HJ00-0AB0)  Where x=0 or higher  V4.0.3 or higher (CPU with order number 6ES7 417-4HL04-0AB0 and 6ES7 414-4HJ04-0AB0)
CPU Firmware (requires EDC RAM module: 6ES7 955-2AM10-0AA0; requires CPU 417H: 6ES7417-4HL01-0AB0)	V3.11.x  Where x=3 or higher
CFC	V5.2 or higher  V6.0
STEP 7	V5.1.3  V5.2

### 3.2 F-Library V1\_2

S7 F Systems V5.2 in combination with Failsafe Blocks (V1\_2) library

Function	Version
CPU Firmware	V3.1.x (CPU with order number 6ES7 417-4HL01-0AB0 and 6ES7 414-4HJ00-0AB0)  Where x=0 or higher  V4.0.3 or higher (CPU with order number 6ES7 417-4HL04-0AB0 and 6ES7 414-4HJ04-0AB0)
CPU Firmware (requires EDC RAM module: 6ES7 955-2AM10-0AAA0; requires CPU 417H: 6ES7417-4HL01-0AB0)	V3.11.x Where x=3 or higher
CFC <sup>1)</sup>	V5.2 or higher
STEP 7 <sup>1)</sup>	V5.1 or higher

<sup>1)</sup> Further restrictions specific to modules or versions of the optional package S7 F Systems can be found in the corresponding user documentation.

Munich, June 30<sup>th</sup>, 2005



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