

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Selected original pages for procurement and maintenance review

PRODUCT BRAND

Siemens

PRODUCT MODEL

6ES7138-4FA03-0AB0

ET 200S Safety Input Module

SOURCE EDITIONS AND SCOPE

03/17/2020; last modified 03/14/2020 (PDF 1,2); 07/2013, A5E00103686-08 (PDF 2,27,28); 10/2015, A5E03310062-AE (PDF 9,13,15)

Selected manufacturer product-reference pages for FA03. Includes complete datasheet and applicable power-assignment/safety-characteristic context; not a full installation manual. Values remain subject to the original application and whole-system conditions.

Open identified Siemens source (complete document)

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Amikon prepared this independent reference package. Siemens remains the author of the appended original pages; original page numbers and manufacturer notices are retained.

SIMATIC DP, ELECTRON. MODULE F. ET200S, 4/8 F-DI
PROFISAFE, 24V DC, 30 MM WIDTH UP TO CATEGORY 4
(EN954-1)/ SIL3 (62061) ALSO USEABLE IN PROFINET-
NETWORK WITH IM151-3 HF

Supply voltage	
Rated value (DC)	
• 24 V DC	Yes
Reverse polarity protection	No
Encoder supply	
Number of outputs	2
Type of output voltage	min. L+ (-1.5 V)
Short-circuit protection	Yes; Electronic (response threshold 0.7 A to 1.8 A)
Output current	
• Rated value	300 mA
• permissible range, lower limit	0 mA
• permissible range, upper limit	300 mA
Power loss	
Power loss, typ.	4 W
Address area	
Address space per module	
• Inputs	6 byte
• Outputs	4 byte
Digital inputs	
Number of digital inputs	8; 8 single channel, 4 two-channel
Input characteristic curve in accordance with IEC 61131, type 1	Yes
Input voltage	
• Rated value (DC)	24 V
• for signal "0"	-30 to +5V
• for signal "1"	+15 to +30 V
Input current	
• for signal "1", typ.	3.7 mA
Input delay (for rated value of input voltage)	
for standard inputs	
— parameterizable	Yes
— at "0" to "1", min.	0.3 ms

— at "0" to "1", max.	17 ms
— at "1" to "0", min.	0.3 ms
— at "1" to "0", max.	17 ms
Cable length	
• shielded, max.	200 m
• unshielded, max.	200 m
Encoder	
Connectable encoders	
• 2-wire sensor	No
Interrupts/diagnostics/status information	
Diagnostics function	Yes
Diagnostics indication LED	
• Group error SF (red)	Yes
• Status indicator digital input (green)	Yes
Potential separation	
Potential separation digital inputs	
• between the channels	No
• between the channels and backplane bus	Yes
• Between the channels and load voltage L+	No
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
• acc. to EN 954	Cat. 3 (single-channel), Cat. 4 (two-channel)
• SIL acc. to IEC 61508	SIL 2 (single-channel), SIL 3 (two-channel)
Dimensions	
Width	30 mm
Height	81 mm
Depth	52 mm
Weights	
Weight, approx.	78 g
last modified:	03/14/2020 

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

 DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

 WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Assigning Power Modules to Electronic Modules/Motor Starters

The table below lists the power modules and electronic modules/motor starters you can operate within the same potential group.

Note that certain combinations limit the maximum safety class which can be attained.

Table 2- 3 Assigning Power Modules to Electronic Modules/Motor Starters and Safety Class

Power Modules	For a Description, See ...	Electronic Module/Motor Starter	Use and achievable SIL/Category/PL	
PM-E F pm DC24V PROFIsafe	"Power module PM-E F pm DC24V PROFIsafe"	can be used with all released standard electronic modules	Safe shutdown of DO modules of the ET 200S series	SIL2/Cat egory 3/PLd
PM-E F pp DC24V PROFIsafe	"Power module PM-E F pp DC24V PROFIsafe"			
PM-D F DC24V PROFIsafe	"Power module PM-D F DC24V PROFIsafe"	Can only be used for: - F-DS1e-x, F-RS1e-x fail-safe motor starters (F-MS) - Connection multiplier F-CM - PM-D F X1 power/expansion module - Expansion modules Brake Control xB1 and xB2	Safe shutdown of motor starters	SIL3/Cat. 4/PLe
		Can be used for the F-motor starters indicated above: Brake Control xB3 and xB4 expansion modules	Safe shutdown of motor starters	SIL2/Cat egory 3/PLd
PM-E DC24V	<i>Power Module manual PM-E DC24V (bis 6ES7138-4CA01-0AA0)</i>	can be used with all released standard and fail-safe electronic modules	Power supply to F-DI, F-DO and F-RO modules: up to 6ES7138-4FA03-0AB0 up to 6ES7138-4FC01-0AB0 up to 6ES7138-4FB02-0AB0 up to 6ES7138-4FR00-0AA0	SIL2/Cat egory 3/PLd
			Supply of F-DI modules, F-DO modules: 6ES7138-4FA05-0AB0 6ES7138-4FB04-0AB0	SIL3/Cat. 4/PLe

Power Modules	For a Description, See ...	Electronic Module/Motor Starter	Use and achievable SIL/Category/PL	
PM-E DC24..48V	<i>PM-E DC24..48V (6ES7138-4CA50-0AB0) Power Module manual</i>	Can be used with all standard and fail-safe electronic modules	Power supply to F-DI, F-DO and F-RO modules	SIL3/Cat. 4/PLe
PM-E DC24..48V/AC24..230V	<i>PM-E DC24..48V/AC24..230V (bis 6ES7138-4CB11-0AB0) Power Module manual</i>			

See also

Properties of the PM-E F pm DC24V PROFIsafe Power Module (Page 77)

Properties of the PM-E F pp DC24V PROFIsafe Power Module (Page 98)

Properties of the PM-D F DC24V PROFIsafe Power Module (Page 113)

Security information

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For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. You can find more information about industrial security on the Internet (<http://www.siemens.com/industrialsecurity>).

To stay informed about product updates as they occur, sign up for a product-specific newsletter. You can find more information on the Internet (<http://support.automation.siemens.com>).

PFDavg and PFH values for components with use in SIMATIC Safety, Distributed Safety and F/FH Systems

This product information contains **important information on the F-systems SIMATIC Safety, Distributed Safety and F/FH Systems**. The Product Information is part of the product supplied.

PFDavg and PFH values

The following tables contain the PFDavg and PFH values for individual components with use in SIMATIC Safety (S), Distributed Safety (D) and F/FH Systems (F) with a repair time of 100 hours:

F-CPU S7-1200/1500	Operation in low demand mode low demand mode According to IEC 61508:2010: PFDavg = Average probability of a dangerous failure on demand	Operation in high demand or continuous mode high demand/continuous mode According to IEC 61508:2010: PFH = Average frequency of a dangerous failure [h ⁻¹]	With a mission time of	S	D	F
For all F-CPU S	< 2E-05	< 1E-09	20 years	x	-	-

F-I/O ET 200SP	Article number	Operation in low demand mode low demand mode According to IEC 61508:2010: PFD_{avg} = Average probability of a dangerous failure on demand	Operation in high demand or continuous mode high demand/continuous mode According to IEC 61508:2010: PFH = Average frequency of a dangerous failure [h⁻¹]	With a mission time of	S	D	F
F-DI 8x24VDC HF	6ES7136-6BA00-0CA0	SIL 3: < 2E-05	SIL 3: < 1E-09	20 years	x	x	-
F-DQ 4x24VDC/2A PM HF	6ES7136-6DB00-0CA0	SIL 3: < 2E-05	SIL 3: < 1E-09	20 years	x	x	-
F-PM-E 24VDC/8A PPM ST	6ES7136-6PA00-0BC0	SIL 3: < 2E-05	SIL 3: < 1E-09	20 years	x	x	-
F-RQ 1x24VDC/24..230V AC/5A	6ES7136-6RA00-0BF0	SIL 2: < 1E-04, with function test 1x per year	SIL 2: < 1E-08, with function test 1x per year	20 years	x	x	-
		SIL 3: < 1E-05, with function test 1x per month	SIL 3: < 6E-09, with function test 1x per month	20 years	x	x	-

F-I/O ET 200S	Article number	Operation in low demand mode low demand mode (PFD = average probability of failure on demand)	Operation in high demand or continuous mode high demand/continuous mode (PFH = probability of a dangerous failure per hour)	With a mission time of	S	D	F
4/8 F-DI DC24V PROFIsafe	6ES7138-4FA03-0AB0	SIL 2: < 1E-03 SIL 3: < 1E-05	SIL 2: < 1E-08 SIL 3: < 1E-10	20 years	x	x	x
	6ES7138-4FA04-0AB0	SIL 2: < 1E-03 SIL 3: < 1E-05	SIL 2: < 1E-08 SIL 3: < 1E-10	20 years	x	x	x
	6ES7138-4FA05-0AB0	SIL 2: < 1E-03 SIL 3: < 1E-05	SIL 2: < 1E-08 SIL 3: < 1E-10	20 years	x	x	x
4 F-DO DC24V/2A PROFIsafe	6ES7138-4FB02-0AB0	SIL 3: < 1E-05	SIL 3: < 1E-10	20 years	x	x	x
	6ES7138-4FB03-0AB0	SIL 3: < 1E-05	SIL 3: < 1E-10	20 years	x	x	x
	6ES7138-4FB04-0AB0	SIL 3: < 1E-05	SIL 3: < 1E-10	20 years	x	x	x
4 F-DI/3 F-DO DC24V PROFIsafe	6ES7138-4FC00-0AB0	SIL 2: < 1E-04	SIL 2: < 1E-08	20 years	x	x	x
	6ES7138-4FC01-0AB0	SIL 2: < 1E-04	SIL 2: < 1E-08	20 years	x	x	x
PM-E F pm DC24V PROFIsafe	6ES7138-4CF02-0AB0	SIL 3: < 1E-05	SIL 3: < 1E-10	20 years	x	x	x
	6ES7138-4CF03-0AB0	SIL 3: < 1E-05	SIL 3: < 1E-10	20 years	x	x	x
PM-E F pp DC24V PROFIsafe	6ES7138-4CF41-0AB0	SIL 3: < 1E-05	SIL 3: < 1E-10	20 years	x	x	x
	6ES7138-4CF42-0AB0	SIL 3: < 1E-05	SIL 3: < 1E-10	20 years	x	x	x
1 F-RO DC24V/AC24..230V /5A	6ES7138-4FR00-0AA0	SIL 3: < 1E-05	SIL 3: < 1E-09	20 years	x	x	x

Fail-safe GSD based DP slaves Fail-safe GSD based IO devices Fail-safe PA field devices Fail-safe HMI devices	Operation in low demand mode low demand mode According to IEC 61508:2010: PFD_{avg} = Average probability of a dangerous failure on demand	Operation in high demand or continuous mode high demand/continuous mode According to IEC 61508:2010: PFH = Average frequency of a dangerous failure [h⁻¹]	With a mission time of	S	D	F
Fail-safe GSD based DP slaves: See Technical Data for fail-safe GSD based DP slave						
Fail-safe GSD based IO devices: See Technical Data for fail-safe GSD based IO device						
Fail-safe PA field devices: See Technical Data for fail-safe PA field device						
Fail-safe HMI devices: See technical specifications on the fail-safe HMI device						
Other fail-safe devices: See technical specifications on the fail-safe device						

Determine the contribution of the F-system to the PFD_{avg} and PFH values

The contribution of the fail-safe system to the PFD_{avg} and PFH values of a safety function is determined by adding the PFD_{avg}- and PFH values of the F-CPU and F-I/Os involved.

The contribution of the safety-related communication is added to this. Please note that several F-systems can be involved in a safety function.

You determine the PFD_{avg} and PFH values of a safety function by adding the contribution of the fail-safe system to the contribution of the encoders and actuators involved in the safety function.

Calculation example

A safety function is implemented with a SIMATIC Safety F-system. The F-CPU and F-I/O listed in the following table are involved in the safety function.

20 years was selected as the mission time. The fail-safe signal modules operate in safety mode for SIL3/Kat.4/PL_e. Operation is in high demand mode:

F-CPU, F-SMs and safety-related communication involved in the safety function	Quantity	Probability of a dangerous failure per hour
CPU 319F-3 PN/DP 6ES7318-3FL01-0AB0	1	3E-09
SM 326; DO 10 × DC 24V/2A 6ES7326-2BF01-0AB0	1	1E-09
SM 326; DI 24 × DC 24V 6ES7326-1BK02-0AB0	2	2E-09
Safety-related communication		1E-09
Total		7E-09

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PFD_{avg} and PFH values for components with use in SIMATIC Safety, Distributed Safety and F/FH Systems
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