

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Selected original pages for procurement and maintenance review

PRODUCT BRAND

Siemens

PRODUCT MODEL

6ES7138-4CF03-0AB0

ET 200S Fail-Safe Power Module

SOURCE EDITIONS AND SCOPE

08/16/2019; last modified 08/16/2019 (PDF 1,2,3); 10/2015, A5E03310062-AE (PDF 9,13,15); 07/2022, A5E39001523-AA (PDF 6,7,8,9,10)

The 2013 original diagrams use inconsistent P1/P2 polarity labels. This package provides product characteristics and later safety/approval updates only, not installation drawings or a commissioning manual. Obtain manufacturer clarification before wiring. Do not use the original historical safety values without the appended 2015 and 2022 information.

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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, Power Module PM-E F PROFIsafe, f. ET200S; 24 V DC suitable for ungrounded setup relay for switching the voltage buses P1 and P2 up to Category 3 (EN 954-1)/ SIL2 (IEC61508)/PLD (ISO13849), 2 fail-safe dig. outputs up to Category 4 (EN 954-1)/ SIL3 (IEC61508)/PLE (ISO13849), can also be used in PROFINET configuration with IM 151-3 HF

Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V
• Reverse polarity protection	No
Input current	
From load voltage L+ (no load), typ.	100 mA
from backplane bus 24 V DC, max.	28 mA
Power loss	
Power loss, typ.	4 W
Address area	
Address space per module	
• Inputs	5 byte
• Outputs	5 byte
Digital outputs	
Number of digital outputs	2
Short-circuit protection	Yes; Electronic

• Response threshold, typ.	Response threshold (short-circuit): 5 to 12 A; response threshold (external short-circuit to ground): 5 to 12 A; response threshold (external short-circuit to P potential): 25 to 45 A
Limitation of inductive shutdown voltage to	L+ (-2x 47 V)
Controlling a digital input	No
Switching capacity of the outputs	
• on lamp load, max.	10 W
Load resistance range	
• lower limit	12 Ω
• upper limit	1 k Ω
Output voltage	
• for signal "1", min.	L+ (-2,0 V), current sourcing switch: L+ (-1,5 V), voltage drop on current sinking switch: max. 0.5 V
Output current	
• for signal "1" rated value	2 A
• for signal "1" permissible range for 0 to 60 °C, min.	20 mA
• for signal "1" permissible range for 0 to 60 °C, max.	2.4 A
• for signal "0" residual current, max.	0.5 mA
Parallel switching of two outputs	
• for uprating	No
• for redundant control of a load	No
Switching frequency	
• with resistive load, max.	30 Hz
• with inductive load, max.	0.1 Hz
• on lamp load, max.	10 Hz
Total current of the outputs (per group)	
horizontal installation	
— up to 40 °C, max.	10 A
— up to 55 °C, max.	7 A
— up to 60 °C, max.	6 A
vertical installation	
— up to 40 °C, max.	6 A
Relay outputs	
Switching capacity of contacts	
— with resistive load, up to 50 °C, max.	10 A
Cable length	
• shielded, max.	200 m
• unshielded, max.	200 m
Interrupts/diagnostics/status information	
Diagnostics function	Yes

Diagnostic messages	
• Diagnostic information readable	Yes
• Wire-break	Yes
• Short-circuit	Yes
• missing load voltage	Yes
Diagnostics indication LED	
• Rated load voltage PWR (green)	Yes
• Group error SF (red)	Yes
• Status indicator digital output (green)	Yes
Potential separation	
Potential separation digital outputs	
• between the channels	No
• between the channels and backplane bus	Yes
• Between the channels and load voltage L+	No
Isolation	
Isolation tested with	500 V DC
Standards, approvals, certificates	
Highest safety class achievable in safety mode	
• acc. to EN 954	4
• Performance level according to ISO 13849-1	e
• SIL acc. to IEC 61508	Up to SIL 3
Dimensions	
Width	30 mm
Height	81 mm
Depth	52 mm
Weights	
Weight, approx.	88 g
last modified:	08/16/2019 

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

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
A5E03310062-AE, 10/2015

SIEMENS

SIMATIC

ET 200S

Product Information for the ET 200S Distributed I/O System, Fail-Safe Modules manual

Product Information

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit <https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit <https://www.siemens.com/cert>.

Introduction

This Product Information contains additions and corrections to the installation and Operating Manual "ET 200S Distributed I/O System, Fail-Safe Modules". The Product Information is part of the product supplied. This Product Information should be considered more up-to-date than other documentation if uncertainties arise.

This Product Information applies to the following products:

- PM-E F pm DC24V PROFI-safe (6ES7138-4CF03-0AB0)
- PM-E F pp DC24V PROFI-safe (6ES7138-4CF42-0AB0)
- 4/8 F-DI DC24V PROFI-safe (6ES7138-4FA05-0AB0)
- 4 F-DI/3 F-DO DC24V PROFI-safe (6ES7138-4FC01-0AB0)
- 4 F-DO DC24V/2A PROFI-safe (6ES7138-4FB04-0AB0)
- 1 F-RO DC24V/AC24..230V/5A (6ES7138-4FR00-0AA0)

"Standards and approvals" section

Amendment of the IEC 61131-2 standard

The references to the IEC 61131-2 standard in the manual are replaced by the EN 61131-2:2007 standard.

Supplement: UKCA mark



The ET 200S distributed I/O system complies with the designated British standards (BS) for programmable logic controllers published in the official consolidated list of the British Government. The ET 200S distributed I/O system meets the requirements and protection targets of the following regulations and related amendments:

- Electrical Equipment (Safety) Regulations 2016 (Low-Voltage)
- Electromagnetic Compatibility Regulations 2016 (EMC)
- Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016 (Explosion Protection)
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (RoHS).
- Supply of Machinery (Safety) Regulations 2008 for ET 200S safety components (fail-safe modules)

UK Declarations of Conformity for the respective authorities are available from:

Siemens AG
Digital Industries
Factory Automation
DI FA TI COS TT
P.O. Box 1963
D-92209 Amberg

The UK Declaration of Conformity are also available for download from the Siemens Industry Online Support website, under the keyword "Declaration of Conformity".

Correction: ATEX approval



In accordance with EN 60079-7 (Electrical Apparatus for Potentially Explosive Atmospheres - Part 7: Increased safety "e") and EN IEC 60079-0 (Electrical apparatus for potentially explosive gas atmospheres - Part 0: General requirements).

II 3 G Ex ec IIC Tx Gc

DEKRA 21ATEX0047 X

Special conditions in potentially explosive atmospheres:

- In the area of application of the device, a maximum pollution degree of 2 according to EN 60664-1 is permissible.
- The device must be installed in a suitable housing that ensures a degree of protection of at least IP54 according to EN IEC 60079-0. The ambient conditions must be taken into account during use.
- Precautions must be taken to prevent the nominal voltage from being exceeded by more than 119 V due to short-term mains disturbances.

Correction: IECEx approval



In accordance with IEC 60079-7 (Explosive Atmospheres - Part 7: Equipment protection by increase safety "e")

II 3 G Ex ec IIC Tx Gc

IECEx DEK 21.0029 X

Special conditions in hazardous areas:

- The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.
- The device must be installed in a suitable housing that ensures a degree of protection of at least IP54 according to IEC 60079-0. The ambient conditions must be taken into consideration for use.
- Provisions shall be made to prevent the nominal voltage from being exceeded by transient disturbances of more than 119 V.

Supplement: UKEX approval



In accordance with EN 60079-7 (Electrical Apparatus for Potentially Explosive Atmospheres - Part 7: Increased safety "e") and EN IEC 60079-0 (Electrical Apparatus for Potentially Explosive Atmospheres - Part 0: General Requirements).

II 3 G Ex ec IIC Tx Gc

DEKRA 21UKEX0010 X

Special conditions in potentially explosive atmospheres:

1. The equipment shall only be used in an area of not more than pollution degree 2, as defined in EN 60664-1.
2. The equipment shall be installed in a suitable enclosure providing a degree of protection not less than IP54 in accordance with EN IEC 60079-0. The ambient conditions must be taken into consideration for use.
3. Provisions shall be made to prevent the nominal voltage from being exceeded by transient disturbances of more than 119 V.

Supplement: CCCEx approval



In accordance with GB/T 3836.3 (Explosive Atmospheres - Part 3: Device protection through type of protection "e") and GB/T 3836.1 (Explosive Atmospheres - Part 1: Equipment - General requirements).

Ex ec IIC Tx Gc

Special conditions in hazardous areas:

- The equipment shall only be used in an area of not more than pollution degree 2, as defined in GB/T 16935.1.
- The device must be installed in a suitable housing that ensures a degree of protection of at least IP54 according to GB/T 3836.1. The ambient conditions must be taken into consideration for use.
- Precautions must be taken to protect against the nominal voltage being exceeded by more than 119 V due to short-term interference voltages

Amended section "Safety-related symbols"

Safety-related symbols for devices without Ex protection

The following table contains an explanation of the symbols located in your SIMATIC device, its packaging or the accompanying documentation.

Symbol	Meaning
	General warning sign Caution/Notice You must read the product documentation. The product documentation contains information about the potential risks and enable you to recognize risks and implement countermeasures.
	Read the information provided by the product documentation. ISO 7010 M002
	Ensure the device is only installed by electrically skilled person. IEC 60417 No. 6182
 CABLE SPEC.	Note that connected mains lines must be designed according to the expected minimum and maximum ambient temperature.
 EMC	Note that the device must be constructed and connected in accordance with EMC regulations.
 230V MODULES	Note that a 230 V device can be exposed to electrical voltages which can be dangerous. ANSI Z535.2
 24V MODULES	Note that a device of Protection Class III may only be supplied with a protective low voltage according to the standard SELV/PELV. IEC 60417-1-5180 "Class III equipment"
 INDOOR USE ONLY INDUSTRIAL USE ONLY	Be aware that the device is only approved for the industrial field and only for indoor use.
	Note that an enclosure is required for installing the device. Enclosures are considered: • Standing control cabinet • Serial control cabinet • Terminal boxes • Wall enclosure

Safety-related symbols for devices with Ex protection

The following table contains an explanation of the symbols located in your SIMATIC device, its packaging or the accompanying documentation.

Symbol	Meaning
 ONLY EX MODULES	The assigned safety symbols apply to devices with Ex approval . You must read the product documentation. The product documentation contains information about the potential risks and enable you to recognize risks and implement countermeasures.
	Read the information provided by the product documentation. ISO 7010 M002

Symbol	Meaning
 F<2N DISPLAY F<4N HOUSING	Ensure the device is only installed by electrically skilled person. IEC 60417 No. 6182
 CABLE SPEC.	Observe the mechanical rating of the device.
 CABLE SPEC.	Note that connected mains lines must be designed according to the expected minimum and maximum ambient temperature.
 EMC	Note that the device must be constructed and connected in accordance with EMC regulations.
 U = 0V	When the device is under voltage, note that it may not be installed or removed, or plugged or pulled.
 230V MODULES	Note that a 230 V device can be exposed to electrical voltages which can be dangerous. ANSI Z535.2
 24V MODULES	Note that a device of Protection Class III may only be supplied with a protective low voltage according to the standard SELV/PELV. IEC 60417-1-5180 "Class III equipment"
 INDOOR USE ONLY INDUSTRIAL USE ONLY	Be aware that the device is only approved for the industrial field and only for indoor use.
 ZONE 2 INSIDE CABINET IP54	For Zone 2 potentially explosive atmospheres, be aware that the device may only be used when it is installed in an enclosure with a degree of protection $\geq$ IP54.
 ZONE 22 INSIDE CABINET IP6x	For Zone 22 potentially explosive atmospheres, be aware that the device may only be used when it is installed in an enclosure with a degree of protection $\geq$ IP6x.

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