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.

Siemens AG
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

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Preface

Product family Add 7

The Add-on products of the Add 7 product family provide a cost-effective solution for the specific high-performance requirements in the field of process control and automation engineering. The design of these products is based on many years of experience in the field of process engineering, and on solid expertise with respect to the current system generation in the Siemens “Totally Integrated Automation“ program.

As part of the Add 7 product family, the AddFEM Front End Module satisfies the special requirements of high-speed turbine control systems (different signal types, redundancy, high-speed detection and signal preparation etc.)

Enhancement to module type 6DL3100-8AC compared to 6DL3100-8AA

6DL3100-8AC offers the option of operating the AddFEM in redundant mode (module redundancy), and/or to process signal preparation functions on the AddFEM.

The AddFEM 6DL3100-8AC can be programmed in RUN using DPV1 services.

Further support

If you have any questions about the use of the products described in this manual and do not find the right answers, please contact your Siemens partner at your local Siemens Office or Agencies.

CE Label

Our products are compliant with EC Directive 2004/108/EC “Electromagnetic Compatibility, EC Directive 73/23/EEC “Low-voltage Directive”, and the European Harmonized Standards specified in those directives (EN).

CE

You can view the EC Declaration of Conformity in the appendix. It is available to responsible authorities, according to the EC Directives mentioned earlier, at:

Siemens Aktiengesellschaft
Industry Sector Industry Automation Division
I IA CE SE PRM EN
Siemensallee 84
D 76181 Karlsruhe

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1.1 Classification and features

The add-on products of the Add 7 product family provide solutions for specific and high-performance applications in the field of process control and automation engineering.

The Front End Module of the Add 7 product family is tailored to the special requirements of high-speed turbine control systems (different signal types, redundancy, high-speed acquisition and preparation of process data, etc.) AddFEM supports the implementation of loop control systems in the gas-, steam- and water-driven and industrial turbines sector. The AddFEM is also suitable for integrated automation and loop control applications where the emphasis is set on high-speed system reaction times.

The AddFEM offers highly versatile combination options. It supports integration in SIMATIC S7 and SIMATIC PCS 7 systems, and in SPPA-T3000 or SIMADYN D. The AddFEM operates in DP standard slave mode, and is controlled via PROFIBUS DP. The loop control and automation functions are handled as usual by the automation processor.

Signal inputs and outputs

The AddFEM is equipped with analog and digital IOs, including counter inputs for the acquisition of velocity control data.
Due to the optimized composition of signals, and based on an organization by the various signal types, smaller applications can be easily handled by a single AddFEM module. More complex applications, of course, can be handled by integrating several modules.

Each AddFEM provides the following signal inputs and outputs:

- 12 analog inputs, of which six may be operated as current inputs, while the remaining six may be configured in SIMATIC Manager or COM-PROFIBUS for operation as current or voltage inputs
- 8 analog outputs
- 15 digital inputs, of which three are available as counting pulse inputs for the acquisition of velocity control data with and without detection of the rotational direction
- 16 digital outputs, optionally operable as digital inputs

Due to the design of its analog IO measuring ranges, the AddFEM does not require any additional signal transducers when operated in turbine loop control systems. In addition to the usual measuring ranges 0 mA to 20 mA, 4 mA to 20 mA and ±20 mA, the module provides a ±30 mA measuring range. An additional ±50 mA measuring range at the analog outputs supports the control of final control element with higher current consumption, such as fuel control valves, without additional signal amplifier.

All analog and digital outputs are short circuit-proof and monitored, and can be wired in parallel with other outputs. The analog and digital circuits are electrically isolated.

For further technical specifications of the IO, refer to section 4.

Higher availability due to redundancy

Redundancy in this context refers to the integration of a "1 of 2" structure. Availability is enhanced by means of parallel operation of two AddFEM modules. If one AddFEM fails as a result of error, the standby module automatically takes over the functions.

Redundancy of an AddFEM 6DL3100-8AA is controlled by the integrated functions in the automation processor configuration. In contrast, this redundancy control is integrated in the system performance of an AddFEM 6DL3100-8AB/-8AC. The redundancy coupling function on this module is implemented by a fiber optic interface which is used to transfer the status and update data. The extensive, integrated redundancy mechanisms and self-diagnostics functions of AddFEM support automatic error detection and redundant changeover, without any user intervention.

Redundant PROFIBUS DP connection

The AddFEM is equipped with two PROFIBUS DP interfaces (DP A and DP B) which operate in parallel which support the implementation of redundant system structures. All process input data are routed to both PROFIBUS DP interfaces, whereas only the process output data of the currently active DP interface are passed to the output pins. The process output data of the currently passive DP interface are analyzed for the purpose of monitoring. The master standby status of both DP interfaces, i.e. the definition of which DP interface is active or passive with respect to the output data can be set by the automation processor.

Preparation functions

Certain partial automation functions, such as the position control of turbine loop control circuits, can be swapped to the AddFEM as preparation functions. These functions are referred to as front-end function (FEF.)

GSD file

The PROFIBUS DP parameters and properties of the IO (measuring ranges, filtering, for example) of an AddFEM operated on SIMATIC S7 and SIMATIC PCS 7 systems can be set in SIMATIC Manager using HW Config. When operated on a SIMADYN-D system, the corresponding settings are programmed using the COM-PROFIBUS software package.

For information on using the GSD file, refer to the “readme.pdf“ on your AddFEM CD.

Module power supply

The AddFEM power supply is designed to operate at a rated voltage of 24 V DC, and at a typical current consumption of 20 W. Voltage dips with a duration of at least 10 ms are buffered. The inrush current is limited to 3 A.
The AddFEM is equipped with an internal 24 V DC power supply for the analog outputs. The 24 V DC load voltage for the digital outputs must be generated by an external power supply which is wired to the X7 connectors.

Design

The AddFEM enclosure is made of stainless steel, and is prepared for screw-mounting or rail mounting.

The signal state of the digital IO is indicated by signal LEDs.

The operating and error states of AddFEM are indicated at 12 separate LEDs. The mode of operation is set by means of a key switch and slider.

The AddFEM front panel features eight 10-pin connectors (total of 80 IO pins) for the connection of process IO signals.

Certifications

In addition to the CE label, the AddFEM is also certified to UL/CSA.

1.1.1 Enhancement of 6DL3100-8AC variant (compared to -8AA/-8AB)

The enhanced DPV1 services of AddFEM are in particular suitable to provide dynamic parameter data (in acyclic mode) to the front-end functions (FEF.) These enhanced functions also support configuration changes in Run (= CiR = Configuration in RUN). CiR lets you reconfigure AddFEM parameters, such as enabling unused channels, or editing the parameters of active channels when using sensors with different technical specifications. The functionality also includes an option of reporting alarms with implicit acknowledgment mechanism for use by the front-end functions.

PROFIBUS DPV1

Variant 6DL3100-8AC (DPV1 slave) supports DPV1 services to IEC 61158 part 3-6. The DP master, of course, also has to meet those requirements (refer to the DP master documentation.)

PROFIBUS DPV2

Variant 6DL3100-8AC supports the PrmCommand to PROFIBUS Guideline 2.212 for the changeover of communications redundancy (changeover between DPV1 channels A and B), and provides redundancy status data for diagnostics functions.

The table below shows the new functions of the AddFEM DPV1 slave:

Function	DPV0 slave 6DL3100-8AA/-8AB	DPV1 slave 6DL3100-8AC	Comment
Cyclic data exchange	X	**X**	
Ayclic data exchange (read/write data record) DP master class 1 services (parameter assignment master) DP master class 2 services are not supported (SIMATIC PDM, for example)	**-**	**X**	Programming the AddFEM in RUN. Usefulf in particular to supply the front-end function with parameter values.
Diagnostics			
device-specific diagnostics	**X**	**-**	
ID-specific diagnostics	**-**	**X**	One alarm can be reported per diagnostics frame.
module status	**-**	**X**	
Channel-specific diagnostics	**-**	**X**	

Function	DPV0 slave 6DL3100-8AA/-8AB	DPV1 slave 6DL3100-8AC	Comment
Alarms · Diagnostics alarm · manufacturer-specific alarm	 - -	 **X** **X**	 Supports DS0/DS1. This alarm is available to front-end functions.
Redundancy changeover Changeover of communication redundancy between DPV1 channels A and B.	-	**X**	Changeover using the PrmCommand, and reporting of the redundancy state as diagnostics data.

For further information about the configuration in the host system, refer to the relevant FEF manual. The FEF manuals are included on the AddFEM CD, in the folder of the corresponding order number.

1.1.2 Driver blocks

Depending on the automation processor used, you can control the AddFEM using the driver blocks, or, for example in turbine applications with SYMADYN-D, directly in the user program by means of PROFIBUS user frames.

Driver blocks are available for SIMATIC PCS 7 and are located in the "SIMATIC_PCS7_Driver" directory of the CD.

2 Configuration

2

Section overview

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3.1 General functions

Introduction

Disruptions or errors should be detected, localized and reported within the shortest possible time. The AddFEM performs a full self-test after POWER ON (Run Up Self Test), and periodically in normal cyclic operation (Cycle Self Test.)
(see "Technical specifications", section 4.2)

Self-tests/inherent monitoring function:

Components and functions included in the test:
- RAM test
- RAM checksum test (calibration data, program code)
- FEPROM checksum test (calibration data, program code)

Self-tests in cyclic mode

Certain self-test operations must be synchronized with the I/O cycle, and are thus part of this cycle.
Self-tests within the IO cycle:
- RAM test
- PROFIBUS functionality
- Data transfer host <-> AddFEM
- Data transfer <-> redundant AddFEMs
- Cycle times
- Power supply
- Channel errors of process IO
- Coprocessor monitoring by master processor

Delayed shutoff

After a brief host failure or loss of PROFIBUS DP communications, the process outputs will be shut down if a programmable tolerance time is exceeded.
This tolerance time can be set within a range from 10 ms to 3 s.
The default is 0.5 s.
(see section 5.6.1 "Adjustable parameters”)