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.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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.
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1.1 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 customer’s exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under https://www.siemens.com/industrialsecurity.

1.2 Preface

Purpose of the operating instructions

Supplement to the existing operating instructions

These operating instructions supplement the following documentation:

- DP/PA Coupler, Active Field Distributor, DP/PA Link, and Y Link Operating Instructions (http://support.industry.siemens.com/cs/document/1142696)
- Product Information for DP/PA Coupler, DP/PA Link and Y Link Operating Instructions (http://support.industry.siemens.com/cs/document/105657140)
There you can find information on configuring, mounting, wiring, and commissioning the components. The following sections of the documentation for bus links in particular also apply to the bus links with extended fieldbus diagnostics:

- Install
- Connecting
- Operation of the bus link
- Functions

For this reason, these sections are not included in these operating instructions.

- Interface module
- Coupler
- Active field splitter "AFS" and Active field distributor "AFDiSD"
- Bus link "DP/PA Link.

**Additional information**

These operating instructions provide you with the additional information for commissioning a PROFIBUS PA fieldbus segment with extended fieldbus diagnostics.

**Range of validity of these operating instructions**

These operating instructions apply for the following products:

<table>
<thead>
<tr>
<th>Product</th>
<th>Product name</th>
<th>Article number</th>
<th>From version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface module</td>
<td>IM 153-2 (Interface Module)</td>
<td>6ES7153-2BA70-0XB0</td>
<td>V6.1</td>
</tr>
<tr>
<td>Coupler</td>
<td>FDC 157 (Field Device Coupler)</td>
<td>6ES7157-0AC85-0XA0</td>
<td></td>
</tr>
<tr>
<td>Field distributor</td>
<td>AFDiSD (Active Field Distributor Intrinsic Safety with extended fieldbus Diagnosis function)</td>
<td>6ES7655-5DX60-1BB0</td>
<td></td>
</tr>
</tbody>
</table>

These operating instructions contain a description of the components that was valid at the time the operating instructions were published. We reserve the right to include product information with information updates with new components and components with a new product status.

**Basic knowledge required**

To understand these operating instructions you should have general experience in the field of automation engineering. Basic knowledge in the following areas is also required:

- Automation system S7-400
- Distributed I/O systems on PROFIBUS DP
• PROFIBUS PA
• STEP 7/SIMATIC PCS 7 basic software, especially:
  – Working with the SIMATIC Manager
  – Hardware configuration with HW Config
  – Process control system SIMATIC PCS 7
  – Process Device Manager SIMATIC PDM
When using the AFDiSD, you should be familiar with the basics of explosion protection, the identification of explosion-protected equipment and the regulations regarding explosion protection.

Configuring with STEP 7
You can configure the extended fieldbus diagnostics with:
• STEP 7 as of V5.5 SP4 and HSP246 as of V3.0 (for IM 153-2), HSP253 (for Field Device Coupler)
  or with
• SIMATIC PCS 7 as of V8.1
• SIMATIC PDM as of V8.2
  Integrate the required device descriptions in SIMATIC PDM.

Position in the overall information structure
Depending on the hardware used you require the following manuals in addition to these operating instructions:
• The manual for the implemented DP master, including the following special information:
  – Configuring and commissioning of a DP master system
  – Description of the DP master
• The manual SIMATIC NET, PROFIBUS network manual (http://support.industry.siemens.com/cs/document/35222591)
• The installation manual Automation System S7-400: Installation (http://support.industry.siemens.com/cs/document/1117849)
• The operating instructions SIMATIC S7-300 CPU 31xC and CPU 31x: Installation (http://support.industry.siemens.com/cs/document/13008499)
• The manual Automation Systems S7-300, ET 200M Ex I/O modules (http://support.industry.siemens.com/cs/document/1096709), including in particular information on the topics intrinsic safety and explosion protection.
More information on explosion protection can be found in the corresponding directives and standards.
Sign posts

These operating instructions are subdivided into the following subjects:

- Product overview and description of the components
- Application planning and commissioning
- Maintenance and diagnostics
- Technical specifications
- Appendices
- Glossary
- Index

EFD system

A system is designated an EFD system when the following requirements are met by all components involved in communication with the field devices:

- All components (interface module (IM 153-2), couplers (FDC 157), field distributors (AFDiSD)) support extended fieldbus diagnostics.
- The use of extended fieldbus diagnostics is configured for components.

Conventions

The following terms are used as synonyms in this document:

<table>
<thead>
<tr>
<th>Term in the manual</th>
<th>Synonyms</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFD system</td>
<td>Bus link with extended fieldbus diagnostics</td>
<td></td>
</tr>
<tr>
<td>Interface module</td>
<td>IM 153-2 (Outdoor)</td>
<td>Interface module used for the EFD system</td>
</tr>
<tr>
<td>Coupler</td>
<td>FDC 157; Field device coupler</td>
<td></td>
</tr>
<tr>
<td>Field distributor</td>
<td>AFDiSD</td>
<td>but not AFS (Active Field Splitter), this is referred to by its full name: Active field splitter (AFS)</td>
</tr>
<tr>
<td>Bus link</td>
<td>DP/PA Link</td>
<td>In the EFD system, the DP/PA link is used as the bus link. Components of the DP/PA link are an interface module and a coupler.</td>
</tr>
</tbody>
</table>

Please observe notes labeled as follows:

**Note**

A note contains important information about the product described, about handling the product or about a specific section of the documentation that requires particular attention.

Recycling and disposal

The described components are ecologically compatible, and thus suitable for recycling. For environmentally sound recycling and disposal of your old devices please contact a certified disposal service company for electronic scrap.
Additional support

- The technical documentation for the various SIMATIC products and systems is available on the Internet (http://www.siemens.com/simatic-tech-doku-portal).
- You can find the online catalog and online ordering system on the Internet (https://mall.industry.siemens.com).
2.1 Overview

Components required for "extended fieldbus diagnostics"

The following components provide the option for extended fieldbus diagnostics (EFD):

- Interface module
- Coupler
- Field distributor

Note

Article numbers

The article numbers for ordering the components can be found in Preface (Page 5).

Parameter assignment for the EFD-enabled devices

SIMATIC PDM is used to assign parameters to the EFD-enabled devices from a PG/PC, see section Commissioning: EFD system (Page 19).

Reference

Additional information on SIMATIC PCS 7 and PDM can be found in the following documentation on the Internet: [www.siemens.com/pcs7-documentation](http://www.siemens.com/pcs7-documentation)

- Configuration manual SIMATIC; Process Control System PCS 7; Operator Station
- Operating manual SIMATIC; PCS 7 Process Control System, Help for SIMATIC PDM
2.2 EFD system (bus link with extended fieldbus diagnostics)

2.2.1 What is extended fieldbus diagnostics?

Extended fieldbus diagnostics

The extended fieldbus diagnostics allows the configuration and comprehensive diagnostics of the complete bus segment:

- Interface module
- Coupler
- Field distributor
- Connecting cables between the components (AS; bus link and field devices)

If the bus link is configured exclusively with EFD-capable components, you can take advantage of the benefits of the extended field bus diagnostics:

- Rugged infrastructure components - higher ruggedness of the complete system
- Diagnostics information for reliable commissioning of the fieldbus installation
- Diagnostics messages in PCS 7
- Alarm handling in SIMATIC PDM
- Consistent information flow of the system status diagnostics
- Preventive maintenance measures during operation to prevent system downtimes

2.2.2 EFD system

How do extended fieldbus diagnostics work?

The interface module (IM 153-2) maps the status information of the entire connected bus segment. The installed couplers (FDC 157) and active field splitters/distributors (AFS and AFDxxx) determine the status of the connected lines and the physical data of the bus segment and communicates this to the interface module. The information obtained is then displayed using the PCS 7 maintenance station and can be evaluated using SIMATIC PDM.

Exemplary representation for Bus Link with IM 153-2 and FDC 157
Characteristics of extended fieldbus diagnostics

After startup (POWER ON), the bus link detects and initializes all involved fieldbus components. Requirement: Interface module, couplers and field devices must be configured in STEP 7. Each field distributor is initialized with a reserved identifier that cannot conflict with the address mechanism of the respective fieldbus system. The interface module can determine the data of the connected fieldbus segment independent of the topology (line, ring, star topology) and make this available to the user via SIMATIC PDM.

The extended fieldbus diagnostics provides status displays for:

- Bus link (interface module and coupler)
- Field bus
- Each connected field distributor (AFDiSD including the physical layer of the connected spur lines)
Product overview

2.2 EFD system (bus link with extended fieldbus diagnostics)
Description of the components

Interface module (IM 153-2 (Outdoor))

The released interface module is the communication connection of the bus link. The interface module collects all data of the lower-level components (couplers, field distributors, and connected bus segment). For the extended fieldbus diagnostics, the interface module provides an interface to the diagnostics in SIMATIC PDM or PCS 7.

Coupler (FDC 157)

The released coupler is the physical connection to the lower-level bus segment. For the extended fieldbus diagnostics, the coupler must be configured in STEP 7.

Field distributor (AFDiSD)

The field distributor is used for connection of the field devices to the bus segment. For the extended bus diagnostics, you enable the diagnostic capability of the field distributor using a mode selector (see section Enabling/disabling extended fieldbus diagnostics at the field distributor (Page 22)).
Description of the components
4.1 Dimensioning of the systems

SIMATIC Fieldbus Calculator

We recommend using the “SIMATIC Fieldbus Calculator” for dimensioning of plants with active field distributors (AFDxxx or AFS).

You can find detailed information and download the “SIMATIC Fieldbus Calculator” from the Internet (http://support.industry.siemens.com/cs/document/53842953).

Requirement

Use for the bus link to the PROFIBUS PA

Calculation of bus segments before commissioning

1. Determine the components of the bus segment required for your automation task and their layout.

2. Use the "SIMATIC Fieldbus Calculator" to check the physical requirements for the bus segment on the basis of the relevant physical data of the components (line lengths, basic current of the devices, topology, etc.). Based on the entered data and the configuration, the "SIMATIC Fieldbus Calculator" evaluates compliance with the physical and electrical characteristics.

3. If the "SIMATIC Fieldbus Calculator" detects that a limit has been exceeded, you must correct the configuration of the bus segment, for example by changing the line lengths, moving field devices into other bus segments, or distributing the field devices among several bus links.

4. If the “SIMATIC Fieldbus Calculator” confirms that the corrected configuration complies with the physical and electrical quantities, configure the field devices used in your configuration in STEP 7 HW Config.

5. Mount the bus segments in accordance with the verified configuration and connect them.

6. Commission the bus link with extended fieldbus diagnostics (see section Commissioning: EFD system (Page 19)).
4.2 Design versions

4.2.1 Configuration variants of the bus link

The information in the DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link Operating Instructions applies to configuration variants of the bus link for PROFIBUS PA.

4.2.2 Quantity structure for the configuration of an EFD system

Minimum configuration

The following rules apply to the minimum configuration of an EFD system:

<table>
<thead>
<tr>
<th>Function</th>
<th>Component</th>
<th>Number</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface module</td>
<td>IM 153-2 (Outdoor)</td>
<td>1</td>
<td>Interface module</td>
</tr>
<tr>
<td>Coupler</td>
<td>FDC 157</td>
<td>1</td>
<td>Coupler</td>
</tr>
<tr>
<td>Field distributor</td>
<td>AFDISD</td>
<td>1</td>
<td>Field distributor</td>
</tr>
<tr>
<td>Field device</td>
<td>PA field devices</td>
<td>1 PA field device per spur line</td>
<td>Max. 6 spur lines on the field distributor</td>
</tr>
</tbody>
</table>

Maximum configuration

The following rules apply to the maximum configuration of an EFD system:

<table>
<thead>
<tr>
<th>Function</th>
<th>Component</th>
<th>Maximum number</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface module</td>
<td>IM 153-2 (Outdoor)</td>
<td>2</td>
<td>Redundant interface module pair</td>
</tr>
<tr>
<td>Coupler</td>
<td>FDC 157</td>
<td>2</td>
<td>Redundancy; coupler or ring redundancy</td>
</tr>
<tr>
<td>AFS</td>
<td>AFS</td>
<td>1</td>
<td>Active field splitter (AFS) for coupler redundancy:</td>
</tr>
<tr>
<td>Field distributor</td>
<td>AFDISD</td>
<td>5</td>
<td>Field distributor</td>
</tr>
<tr>
<td>Field device</td>
<td>PA field devices</td>
<td>1 PA field device per spur line</td>
<td>Max. 30 PA field device per bus segment for 6 spur lines per field distributor</td>
</tr>
</tbody>
</table>
5.1 Overview for commissioning

Content

In this section, you will learn which steps you need to perform to commission the EFD system.

<table>
<thead>
<tr>
<th>Step</th>
<th>Procedure</th>
<th>See ...</th>
</tr>
</thead>
</table>
| 1.   | Install and connect the components:  
      - Bus link (EFD-capable interface module + EFD-capable coupler)  
      - Field distributor  
      - PROFIBUS PA field devices | Chapters Mounting and Connecting in the Operating Instructions DP/PA coupler, Active Field Distributor, DP/PA Link, and Y Link (http://support.industry.siemens.com/cs/document/1142696) |
| 2.   | Set DIP switch  
      - Interface module:  
        - Address  
        - Redundancy  
      - Field distributor:  
        - Enable EFD - position "D" | Sec. Resetting the interface module (Page 19), Setting the PROFIBUS address and redundancy mode of the coupler (Page 20), Enabling/disabling extended fieldbus diagnostics at the field distributor (Page 22) |
| 3.   | Configure and assign parameters for the bus link with field devices in STEP 7 | Sec. Configuring the bus link with STEP 7 (Page 23) |
| 4.   | Switch on the bus link  
      Download the configuration to the PLC | Sec. Using the Commissioning Wizard for extended fieldbus diagnostics (Page 25) |
| 5.   | Configure in SIMATIC PDM:  
      - Extended fieldbus diagnostics  
      - PROFIBUS PA master system  
      - PROFIBUS PA field devices | Sec. Elimination of errors with the extended fieldbus diagnostics (Page 46) |
| 6.   | Evaluate diagnostics messages | |

Note

Commissioning

The Commissioning Wizard (EFD Wizard) can only be completed if all components configured in HW Config are accessible online.

5.2 Resetting the interface module

The EFD configuration remains stored in the interface module after the supply voltage is switched off.
If you would like to reuse a previously used interface module with a different PROFIBUS address, you must reset the interface module.

**Recommendation:** Reset the PROFIBUS address of the interface module before removing it.

**Procedure**

1. Switch off the power supply.
2. Set the PROFIBUS address of the interface module with the DIP switches to "0" (all switches to the left).
3. Switch on the supply voltage.
   The interface module is reset.

**Note**

**Effects:**
- The following data is reset to the default settings:
  - Internal parameter "Fieldbus diagnostics enabled"
  - EFD configuration is deleted
- I&M data (Identification & Maintenance) remain stored.

4. Check the LED displays:
   A reset is complete when the LEDs have the following status:
   - BF1 LED: **Flashes**
   - All other LEDs have the status: **Off**
5. Switch off the power supply.
6. Set a valid PROFIBUS address for the interface module.

### 5.3 Setting the PROFIBUS address and redundancy mode of the coupler

**Introduction**

Setting the bus address of the coupler is not necessary to operate the bus link.

In the delivery state, the bus address is set to "0" and the redundancy mode is set to "coupler redundancy".

**Rules**

- The only bus address allowed for (both) couplers is "0".
- The redundancy mode that is set on the coupler pair ("RING" switch) and in the configuration (ring or coupler redundancy) must match.
5.3 Setting the PROFIBUS address and redundancy mode of the coupler

- **PROFIBUS address 124** is reserved for internal purposes when the EFD system is used. Configuring or setting of the **PROFIBUS address 124** is not permitted for any components on the bus segment when the EFD system is used.

- With ring redundancy, the FDC 157 on the left ("Coupler 1") must have a lower PA address than the FDC 157 on the right ("Coupler 2")!

**Tools required**

- 3 mm screwdriver

**Commissioning with extended fieldbus diagnostics**

1. Open the front panel of the coupler.
2. Set the bus address "0" using the DIP switches, if necessary (= default setting).
3. Set the redundancy mode via the bottom "RING" DIP switch, if applicable.
4. Set up the bus terminator switch in accordance with the planned wiring.
5. Close the front panel of the coupler.

![Figure 5-1 Setting the PROFIBUS address and redundancy mode](image)

<table>
<thead>
<tr>
<th>1</th>
<th>Bus terminator switch (not relevant for ring or coupler redundancy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON: Bus terminating resistor enabled (= default setting)</td>
<td></td>
</tr>
<tr>
<td>OFF: Bus terminating resistor disabled</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Bus address 0 (= default setting)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>Redundancy mode (not relevant for non-redundant operation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON: Ring redundancy</td>
<td></td>
</tr>
<tr>
<td>OFF: Coupler redundancy (= default setting)</td>
<td></td>
</tr>
</tbody>
</table>

**Changing the DIP switch and bus terminator settings**

This action is not allowed during operation. All changes must be carried out in de-energized state.
5.4 Enabling/disabling extended fieldbus diagnostics at the field distributor

Commissioning with extended fieldbus diagnostics

To use the field distributor in a system with extended fieldbus diagnostics, you must ensure that the mode selector of the field distributor is set to diagnostic mode (switch position = "D").

**NOTICE**

Do not actuate the mode selector of the field distributor during operation

The mode selector of the field distributor must not be actuated during operation.

**Note**

With the factory setting, extended fieldbus diagnostics are disabled (switch position "C" = Compatible mode).

The mode selector is on the left next to the IP30 covers, as shown in the following figure.

![AFDiSD: Mode selector (switch position "D" = Diagnostics mode)](image)

**Procedure**

If you want to actuate the mode selector, proceed as follows:

1. Switch off the power supplies of the bus link (to interface module and coupler).
2. Select the desired mode selector position.
   - To enable the extended fieldbus diagnostics at the field distributor, set the mode selector to position "D".
3. Switch on the power supplies of the bus link.
5.5 Configuring the bus link with STEP 7

Configuring the bus link

Configure and assign parameters to the bus segment in STEP 7 as described in the operating instructions DP/PA coupler, active field distributors, DP/PA Link and Y Link (http://support.industry.siemens.com/cs/document/1142696):

1. Configure the higher-level DP master system.
2. Configure the lower-level PA master system.

To do this, drag the EFD-compatible components from the hardware catalog into your project:

- In STEP 7, select the interface module "IM 153-2 OD (EFD)" from the hardware catalog under "PROFIBUS DP", directory "DP/PA Link". The article number of the interface module is displayed in the lower margin of the display window: 6ES7153-2BA70-0XB0.

- In STEP 7, select the "FDC157-0 (EFD)" coupler(s) from the hardware catalog under "PROFIBUS DP", directory "DP/PA Link". The article number of the coupler is displayed in the bar at the bottom edge of the display window: 6ES7157-0AC85-0XA0

**Note**

Ensure the following:

- The PROFIBUS address that is set on the DIP switch of the coupler is configured in STEP 7 HW Config.
- When ring redundancy is required:
  - The FDC 157 on the left ("Coupler 1") has a lower PA address than the FDC 157 on the right ("Coupler 2").
- PROFIBUS address 124 is not used anywhere on the bus segment.
  - This is reserved for internal purposes of the EFD system.

Additional settings for the extended fieldbus diagnostics

You have to make the following additional settings for the extended fieldbus diagnostics when configuring with STEP 7:

1. In the object properties of the interface module:
   - Activate "Configuration via PDM".
2. In the object properties of the interface module:
   - Deactivate the option "Startup when expected/actual configuration match" (if active).
3. In the object properties of the coupler:
   - Select the DP alarm mode "DPV1" in the station parameters.

After completed configuration, load the project to the CPU.
5.6 Configuring the extended fieldbus diagnostics using SIMATIC PDM

5.6.1 Overview and requirements

You are configuring the extended fieldbus diagnostics in SIMATIC PDM.

Note

When using the extended fieldbus diagnostics, open the EDD only via HW Config.

If you want to open the EDD via the network view, observe the following:

- Determine which interface module is connected to the master H-CPU.
- For the access, select the interface module that is connected to the master H-CPU.

Requirement

- SIMATIC PDM is installed on a computer.
- The computer is connected to an automation system.
- The bus link is completely installed and wired.
- A project has been created in SIMATIC Manager.
- An automation system with a PROFIBUS DP master system was created in HW-Config. The additional settings for extended fieldbus diagnostics have been made (see chapter Configuring the bus link with STEP 7 (Page 23).
- The device description file (EDD) of the interface module is imported.
- The device description files (EDD) of the field devices are imported.
- CPU and Bus Link (interface module and coupler) are switched on.
- The project has been downloaded to the CPU.

Note

Before and during configuration of the extended fieldbus diagnostics, the interface module signals alarms for lower-level components (couplers and field devices) to the automation system, which you can ignore. These alarms are reported as "outgoing" the farther along the configuration of the extended fieldbus diagnostics is towards being completed.

Exception: there are other errors in the plant.

Basic procedure

The most important steps are:

- Enable extended fieldbus diagnostics
- Configure the EFD components or check their configuration (interface module, coupler, field distributors).
• Configure the EFD system or check its configuration.
• Read/save I&M data (Identification & Maintenance) (interface module, coupler, field distributors)

Possible procedures:
• Recommendation:
  Using the Commissioning Wizard for extended fieldbus diagnostics (Page 25)
  In order to avoid errors/problems when commissioning, you should use the Commissioning Wizard.
• Manually configuring the extended fieldbus diagnostics (Page 25)

5.6.2 Using the Commissioning Wizard for extended fieldbus diagnostics

Configuring the extended fieldbus diagnostics using SIMATIC PDM
To configure the extended fieldbus diagnostics, proceed as follows:
1. Select the menu command Device > Commissioning wizard in PDM.
2. Follow the on-screen instructions.

Additional information
You can change the tolerances for measured value deviations for the main line and spur line in the wizard.
The default parameters can be found in section "Technical specifications (Page 69)".

See also
Elimination of errors with the extended fieldbus diagnostics (Page 46)

5.6.3 Manually configuring the extended fieldbus diagnostics
If you do not want to use the recommended Commissioning Wizard for configuring the extended fieldbus diagnostics, perform the steps in this section.

Locating field distributors in the plant
SIMATIC PDM provides the "Find AFDiSD x" function for locating field distributors in the plant. You can find the "Find AFDiSD x" button in the “Device” area of the parameter table of the "AFDiSD x".
When you click this button, all LEDs of the spur lines to the field devices (S1 to S6) flash for 5 s on the sought-after field distributor.
5.6 Configuring the extended fieldbus diagnostics using SIMATIC PDM

Procedure

1. Start STEP 7 and open your station in HW Config.
2. Double-click the interface module (IM 153-2) in HW Config.
Result: SIMATIC PDM is started.
3. Select the PDM menu command Device > Enable extended fieldbus diagnostics.
Result: The topology of the connected bus segment is determined. This process can take up to 3 minutes. SIMATIC PDM is blocked during this time.
When the topology discovery is finished, the parameters of the lower-level objects are displayed in the parameter table in SIMATIC PDM. Some of the parameters can be edited.
4. In SIMATIC PDM, check to make sure the discovered topology/parameters match the actual topology for the connected bus segment.
Does the displayed arrangement of the field devices in the configuration match the actual arrangement of the devices in the field?
   - Configuration: You can find the serial number in the parameter window.
   - Devices in the field: You can find the serial number on the sticker attached to the outside of the device on its right side.

   Association between the parameter table and the actual configuration
   - During operation with coupler redundancy, the upper “Coupler 1” button is associated with the FDC 157 on the left, and the lower button “Coupler 2” is associated with the FDC 157 on the right.
   - The “AFDiSD 1” button is associated with the first field distributor that is connected to “Coupler 1”.
   - The “AFDiSD 2” button is associated with the first field distributor that is connected to “AFDiSD 1”.

Note

Eliminating errors
If errors that require an intervention in the plant occur, follow this sequence to continue with commissioning:
1. Disable the extended fieldbus diagnostics (see section "Disabling extended fieldbus diagnostics (Page 43)").
2. Disconnect the plant from the power supply.
3. Eliminate the error(s) in the plant.
4. Reconnect the plant to the power supply.
5. Continue the configuration beginning with step 3 above (menu command Device > Enable extended fieldbus diagnostics).

5. Enable the utilized spur lines for all field devices in the "Spur line" area of the parameter table for all field distributors.
6. Select the bus link in SIMATIC PDM and select the menu command Device > Download to Devices.
   Wait about 30 s after the download has finished until the settings take effect.
7. Save the current actual topology of the EFD system as the set topology in the interface module:
   
   **Note:**
   You must perform this step even if you do not make any changes to the spur line.
   
   - Use the menu command Device > Upload to PG/PC to upload the current data for the bus link to your programming device or PC.
   
   - Download the data back to the bus link with the menu command Device > Download to Devices.
     
     **Result:** The interface module retentively saves the data of the current configuration for diagnostic purposes. This set topology of the EFD system remains stored even after the power supply has been switched off.

8. **Optional:**

   **Settings in the parameter table:**
   
   - You can change the tolerances for measured value deviations for the main line and spur line in the specified range.
     
     You can find the standard parameters in section "Technical specifications (Page 69)". If a measure value exceeds or falls below the tolerance range, this leads to an EFD diagnostic message; see section Elimination of errors with the extended fieldbus diagnostics (Page 46) for more information.
   
   - You can enter the I&M data (identification and maintenance) of the components (interface module/coupler/field distributors) according to the plant requirements.

   If you have made optional settings, select the menu command Device > Download to Devices.

9. Clear the error memory (see next section "Clearing the error memory").

---

**Note**

Once commissioning is successfully completed (commissioning status "Completed") the following applies:

- **Menu command Device > Upload to PG/PC**
  
  **Menu command is not executed.**
  
  This protects the values stored in the parameter table during commissioning of the EFD system from inadvertent read-back (Upload to PG/PC). The protection continues to apply until values are changed in the parameter table.

- **Menu command Device > Download to Devices**
  
  You can execute the menu command at any time.
Clearing the error memory

1. Select the menu command **Device > Extended fieldbus diagnostics data**.

2. In the "Extended fieldbus diagnostics data" dialog, click the "Overwrite previous status with current status" button.

   The commissioning status is set to "Completed" (green check mark) in the parameter table, and errors signaled during commissioned are deleted.

   **Note:** You can only set the commissioning status to "Completed" with this button.

Figure 5-3  Overwrite previous status with current status
3. The status "Diagnostics active" indicates the "GOOD" condition for the components of the bus segment.
   - When the "Diagnostics active" status is indicated for all components on the bus segment:
     Check to determine whether the actual configuration of the bus segment components, especially the values for current and voltage on the main and spur lines, match the values entered and calculated in the SIMATIC Fieldbus Calculator for this configuration.
   - If a status other than "Diagnostics active" is indicated for components on the bus segment:
     You can find information about this in section Elimination of errors with the extended fieldbus diagnostics (Page 46).
4. When the "Commissioning" parameter is marked with the "Diagnostics active" symbol for all components, commissioning has been successfully completed as far as the extended fieldbus diagnostics is concerned.

```
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Unit</th>
<th>Status</th>
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</tr>
<tr>
<td>AFDISD 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

Figure 5-5  Commissioning status "Completed"

5. Select the File > Save menu command.
6.1 Requirements

Requirement

The following is required for all of the following sub-sections:

- You have successfully commissioned the EFD system (see section Commissioning: EFD system (Page 19)).

| WARNING |

Observe safety information

When the equipment is used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, DP/PA Link and Y Link Operating Instructions. ([http://support.industry.siemens.com/cs/document/105657140](http://support.industry.siemens.com/cs/document/105657140)).

Note

Availability

- Only one error is allowed in the EFD system.
- If more than one error occurs:
  - The availability of the entire system can no longer be guaranteed.
  - The errors must be corrected to eliminate the fault. The EFD system must then be restarted.

6.2 Replacing components during ongoing operation

Replacement during ongoing operation

See section Overview (Page 46) for help on identifying faulty components and the required actions after troubleshooting.

You can replace the following components during operation of the bus segment:

- Replacing a redundant interface module, see section Replacing an interface module (Page 33)
- Replacing a redundant coupler, see section Replacing a coupler (Page 34)
6.2 Replacing components during ongoing operation

- Replacing a field distributor with **ring topology**:  
  - The communication with the field devices connected to the field distributor to be replaced is interrupted.  
    Refer to the safety information in the Product Information for the DP/PA Coupler, DP/PA Link and Y Link Operating Instructions ([http://support.industry.siemens.com/cs/document/105657140](http://support.industry.siemens.com/cs/document/105657140)) and section Replacing a field distributor (Page 35).  
  - Replace the PA main line between each pair of adjacent modules in succession (field distributor to field distributor, field distributor to bus link). This protects field devices against failure.

- Replacing a field distributor with **line topology**. The following communication is interrupted:  
  - Communication with the field devices connected to the field distributor to be replaced  
  - Communication with all downstream field distributors and their connected field devices  
    Refer to the safety information in the Product Information for the DP/PA Coupler, DP/PA Link and Y Link Operating Instructions ([http://support.industry.siemens.com/cs/document/105657140](http://support.industry.siemens.com/cs/document/105657140)) and section Replacing a field distributor (Page 35).

- Replacing cables of the PA main line:  
  - With **line topology**, the communication with all downstream field distributors and their connected field devices is interrupted.  
    Refer to the safety information in the Product Information for the DP/PA Coupler, DP/PA Link and Y Link Operating Instructions ([http://support.industry.siemens.com/cs/document/105657140](http://support.industry.siemens.com/cs/document/105657140)).

- Replacing a field device or cabling to the field device  
  - Communication with the field device is interrupted.

---

**Note**

The two couplers cannot be reached in the EFD system.

For example, if both couplers have been physically removed, the following must be observed:

Once the components are accessible again, the Bus Link System must be restarted.

---

**Final steps**

- After completing the replacement, check the EFD data.
- Check any diagnostic interrupts that occurred during the replacement.
6.3 Replacing components with restart

Replacement with restart

The replacement of the following components requires restarting the bus link. You must first switch off the power supplies of the bus link (to the interface module and coupler).

- Replacing a non-redundant interface module, see section Replacing an interface module (Page 33)
- Replacing a non-redundant coupler, see section Replacing a coupler (Page 34)
- Replacing an active field splitter (AFS)

After making the changes, switch on the power supplies of the bus link again.

Adding/removing a field distributor

Adding or removing a field distributor is a modification of the bus segment's topology.

| NOTICE |
| Re-commissioning required |
| If you modify the bus segment, you must repeat the commissioning procedure (see section Modifying an EFD system (Page 39)). |

See also

Replacing a field distributor (Page 35)

6.4 Replacing an interface module

Requirement

The following requirements must be met for replacing an interface module when extended fieldbus diagnostics are used:

- You need SIMATIC PDM.
- You have successfully completed the commissioning of the EFD system (see section Commissioning: EFD system (Page 19)).

Replacing an interface module

Perform the following steps to replace a defective interface module.

1. Disconnect the power supply to the interface module to be replaced.
2. Unplug the bus connector from the PROFIBUS DP interface of the interface module to be replaced.
3. Replace the interface module with a new (or reset) interface module.
4. Plug the bus connector into the PROFIBUS DP interface of the new module.
5. Set the PROFIBUS address of the new interface module with the DIP switch.
6. Connect the power supply of the new interface module.
7. Restore the configuration data:
   - If you have replaced a non-redundant interface module:
     Download the configuration data stored in SIMATIC PDM to the bus link with the menu command **Device > Download to Devices**.
   - If you have replaced a redundant interface model:
     The interface module newly inserted in the bus link receives the configuration automatically from the interface module remaining on the bus segment.

6.5 Replacing a coupler

**Requirement**

You need SIMATIC PDM.

**Replacing a coupler**

Perform the following steps to replace a defective, redundant or non-redundant coupler:

1. Disconnect the power supply of the coupler to be replaced.
2. Disconnect the PROFIBUS PA connection of the coupler to be replaced.
3. Replace the coupler.
4. Set the PROFIBUS address of the new coupler using the DIP switch.
5. If you are using redundancy mode of the coupler:
   Set the redundancy mode using the DIP switch.
6. Connect the PROFIBUS PA fieldbus to the new coupler.
7. Connect the power supply of the new coupler.
8. Select the PDM menu command **Device > Extended fieldbus diagnostics data**.
9. In the "Extended fieldbus diagnostics data" dialog of the associated bus link (interface module), click the "Overwrite previous status with current status" button to delete errors signaled during the replacement and to set the commissioning status in the parameter table to "Completed".
6.6 Replacing a field distributor

**DANGER**

Explosion hazard

Refer to the safety information in the Product Information for the DP/PA Coupler, DP/PA Link and Y Link Operating Instructions ([http://support.industry.siemens.com/cs/document/105657140](http://support.industry.siemens.com/cs/document/105657140)).

**Requirement**

The following requirements must be met for replacing a field distributor:

- You need SIMATIC PDM for enabled extended fieldbus diagnostics.
- The I&M data of the field distributor have already been saved (together with the configuration of the bus link) with the menu command File > Save in SIMATIC PDM.
- It is possible to replace a field distributor with **ring topology** during operation. The following communication is interrupted:
  - Communication with the field devices connected to the field distributor to be replaced
- It is possible to replace a field distributor with **line topology** during operation. The following communication is interrupted:
  - Communication with the field devices connected to the field distributor to be replaced
  - Communication with all downstream field distributors and their connected field devices

**Replacing a field distributor**

Perform the following steps to replace the field distributor:

1. Remove the 4 screws of the enclosure cover using a Phillips screwdriver.
2. Loosen the black and blue union nuts of the cable glands.
3. Disconnect the PA field devices S1 to S6.
4. Open the IP30 covers T1/T2 and disconnect the main lines.
5. Disconnect the grounding cable of the right or left grounding terminal of the field distributor.
6. Replace the module.
7. Fasten the grounding cable to the right or left grounding terminal of the new field distributor.
8. On the new field distributor, enable extended fieldbus diagnostics using the mode selector (switch position "D" = Diagnostic mode).
9. Connect the PA field devices to the new field distributor (see DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link ([http://support.industry.siemens.com/cs/document/1142696](http://support.industry.siemens.com/cs/document/1142696)) Operating Instructions, section "Connecting the PROFIBUS PA to the field distributor").
10. Connect the main lines T1/T2 to the field distributor and close the IP30 covers until you hear them engage.
11. Tighten the union nuts of the cable glands with 1.3 Nm.

12. Place the enclosure cover on the base and tighten the 4 screws with the plain washers on the enclosure with 2.4 Nm.

13. In the EDD file of the interface module in SIMATIC PDM, select the menu command **Device > Extended fieldbus diagnostics data**.

14. Press the “Topology” button to open the “Topology” dialog.

15. In the “Topology” dialog, click the button of the new field distributor to enter the serial number of the new field distributor in the parameter table. (If the serial number of the field distributor in the parameter table matches the current serial number in the “Topology” dialog, a corresponding message appears).

16. Download the field distributor data stored in SIMATIC PDM to the bus link with the menu command **Device > Download to Devices**.

17. In the "Extended fieldbus diagnostics data" dialog of the associated bus link (interface module), click the "Overwrite previous status with current status" button to delete errors signaled during the replacement and to set the commissioning status in the parameter table to "Completed".

18. Select the **File > Save** menu command.
6.7 Adding/removing/replacing field devices during operation

6.7.1 Adding/removing/replacing a field device during operation using the wizard

Requirement
The following requirements must be met for adding/removing a field device during operation:
- You need SIMATIC PDM.
- After enabling the spur line, you have to perform the usual CiR operations in STEP 7/ SIMATIC PCS 7.

Procedure
To add/remove a field device, follow these steps:
1. If necessary, connect the field device to the existing field distributor during operation.
2. Select the menu command Device > Commissioning wizard in PDM.
3. Follow the on-screen instructions.

Note
Replacing a field device (Commissioning Wizard: Step 4)
Always click Update.
This ensures that the actual values of the EFD system are subsequently transferred to the interface module as setpoints.

6.7.2 Manually adding/removing/replacing a field device during operation

Recommendation:
Always plan for reserve connections on the field distributor. These reserve connections allow you to flexibly expand the bus segment.

Requirement
The following requirements must be met for adding/removing a field device during operation:
- You need SIMATIC PDM.
- After enabling the spur line, you have to perform the usual CiR operations in STEP 7/ SIMATIC PCS 7.

Manually adding/removing a field device
Check the configuration of the bus segment to which the field device is added with the SIMATIC Fieldbus Calculator.
Adding/removing a field device in the plant

- Adding a field device:
  Connect the field device to a previously unused spur line of a field distributor.

- Removing a field device:
  Connect the field device to a previously unused spur line of a field distributor.

Configuration

1. Start STEP 7, and open your SIMATIC station in HW Config.

2. Double-click the interface module in HW Config.
   Result: SIMATIC PDM is started.

3. Perform the following in the parameter table for the corresponding field distributor:
   - Adding a field device:
     Enable the associated spur line to the field device in the parameter table.
   - Removing a field device:
     Disable the associated spur line to the field device in the parameter table.

4. Close the warning displayed.

5. Select the bus link in SIMATIC PDM and select the menu command Device > Download to Devices.
   Wait approximately 30 s after the download is finished for the settings to take effect.

6. Save the current actual topology of the EFD system as the set topology in the interface module:
   Note:
   You must perform this step even if you do not make any changes to the spur line.
   - Use the menu command Device > Upload to PG/PC to upload the current data for the bus link to your programming device or PC.
   - Download the data back to the bus link with the menu command Device > Download to Devices.
   Result: The interface module retentively saves the data of the current configuration for diagnostic purposes. This set topology of the EFD system remains stored even after the power supply has been switched off.

7. Clear the error memory (see next section "Clearing the error memory").

8. Adding a field device only:
   Carry out the CiR operations for adding a field device in STEP 7/SIMATIC PCS 7.
   The full sequence of a system modification and the requirements that must be met for it are described in detail in the manuals:

Replacing a field device

Check the configuration of the bus segment to which the field device is added with the SIMATIC Fieldbus Calculator.
Replacing a field device in the plant
1. Connect the field device to the previously unused spur line.

Configuration
1. Start STEP 7, and open your SIMATIC station in HW Config.
2. Double-click the interface module in HW Config.
   Result: SIMATIC PDM is started.
3. Disable the associated spur line to the field device in the parameter table for the corresponding field distributor.
   This sets the commissioning status of the field device to "Not completed".
4. Close the warning displayed.
5. Enable the associated spur line to the field device in the parameter table for the corresponding field distributor.
6. Save the current actual topology of the EFD system as the set topology in the interface module:
   - Use the menu command Device > Upload to PG/PC to upload the current data for the bus link to your programming device or PC.
   - Download the data back to the bus link with the menu command Device > Download to Devices.
   Result: The interface module retentively saves the data of the current configuration for diagnostic purposes. This set topology of the EFD system remains stored even after the power supply has been switched off.
7. Clear the error memory (see next section "Clearing the error memory").

Clearing the error memory
1. Double-click the interface module in HW Config.
   Result: SIMATIC PDM is started.
2. Select the menu command Device > Extended fieldbus diagnostics data.
3. Click the "Overwrite previous status with current status" button in the "Extended fieldbus diagnostics data" dialog.
4. Select the File > Save menu command.

6.8 Modifying an EFD system

Definition
Modification of an EFD system means, for example, adding/removing a field distributor.
Modifying a bus segment

You can modify a bus segment during operation if the following applies:

- Adding/removing of field devices to/from the existing field distributor
- Adding/removing of a field distributor at the end of the bus segment
  - In non-redundant mode
  - With coupler redundancy
  - With ring redundancy (the end of the bus segment is located before the coupler on the right).

Note

Modification of the bus segment before the last field distributor

If you modify a bus segment before the end of the bus segment, you must accept the fact that problems will occur starting from the "disconnection point" even with a redundant configuration. Pay attention to where you modify the bus segment.

- The bus addresses of the field distributors after the "disconnection point" are changed.
- After the "disconnection point", communication with the field devices located in the segment is disturbed. It is possible that process values will not be transmitted.

To modify a bus segment, follow these steps:

1. Switch off the power supplies of the bus link (to interface module and coupler).
2. Verify the new configuration (number of components, total current) of the bus segment with the SIMATIC Fieldbus Calculator (http://support.industry.siemens.com/cs/document/53842953).
3. Make desired changes to the bus segment in accordance with the results.
4. Switch on the power supplies of the bus link again.
5. Repeat the commissioning, see section Commissioning: EFD system (Page 19).

6.9 Firmware update of the field distributor

When should you update the firmware?

When a plant stoppage is scheduled, you should check whether an update of the firmware version is available. New firmware version generally offers added functions or performance improvements.

Recommendation: Update the components to the newest firmware version (update) in each case.

"Activate firmware after download" option

Note the possible effects of the "Activate firmware after download" option:
Option is disabled

- The firmware update download does not have any effect on the ongoing operation of the bus link.
- The new firmware is stored in the field distributor and is only activated at the next restart of the field distributor, which means that the startup takes longer on this occasion.

Option is enabled

After the firmware update has been downloaded, the field distributor carries out a restart so that field devices connected to the field distributor are disconnected from the bus segment.

- In case of non-redundant operation or operation with coupler redundancy:
  - All field distributors from the updated field distributor onwards are shut down briefly (time for a restart), including all connected field devices.
  - All field distributor after the updated field distributor are integrated in the bus segment again.

- In case of operation with ring redundancy:
  - Updating the firmware of a field distributor does not have any effect on the ongoing operation of the remaining bus segment.
  - The updated field distributor is shut down for a restart, including the connected field devices.

Firmware update blocked

If a firmware update has been interrupted, the status of the field distributor is not defined. A restart of the field distributor is required because a repeated attempt to perform the firmware update is blocked. Switch the field distributor off and back on as soon as possible.

Requirement

- You need the associated STEP 7 project including SIMATIC PDM.
- The current version of the firmware of the field distributor is known.
- You have specified the time for installing the new firmware (see: "Activating firmware after download" option)
- Ensure that the required firmware version is available on the PDM computer.
  You can find the firmware versions on the Internet pages of the Industry Online Support (http://support.industry.siemens.com).

Carrying out a firmware update

To update the firmware of the field distributor, proceed as follows:

1. Connect the programming device or PC with the PROFIBUS parameters suitable for the plant configuration directly to the PROFIBUS interface of the interface module.
2. Double-click the interface module in HW Config.
   Result: SIMATIC PDM is started.
3. Select the PDM menu command **Device > Extended fieldbus diagnostics data**.
4. In the "Extended fieldbus diagnostics data" dialog, click the button of the field distributor whose firmware you want to update.

5. Open the "Device" tab.

**Note**

**Button "Find AFDiSD x"**

You can use the "Find AFDiSD x" button to check whether you have selected the desired field distributor. When you click this button, all LEDs of the spur lines to the field devices (S1 to S6) flash for 5 s on the sought-after field distributor.

6. Take the PROFIBUS address of the bus link and the slot number of the selected field distributor from the "Device" tab under "Address information for firmware update".

7. Note down the address information for all field distributors and close SIMATIC PDM.

8. In SIMATIC Manager, select the **PLC > Accessible Nodes** menu command.

9. In the list that is displayed, select the interface module with the desired PROFIBUS address and select the **PLC > PROFIBUS > Update Firmware** menu command. The remaining procedure is described in the STEP 7 online help.

10. Click the "Select slot" button and enter the slot number of the selected field distributor in the dialog that follows.
11. Download the firmware version for a field distributor.
12. Check the specifications in the dialog.
13. Optional: You can enable or disable (=factory setting) the "Activate firmware after download" option (see below).
14. Click "Execute".
15. Repeat the procedure for all field distributors in the bus segment so that all field distributors have the same firmware version afterwards.

Activating and checking new firmware

Activating new firmware

- If you have used the "Activate firmware after download" option for the firmware update, the new firmware has been activated.
- If the new firmware has not taken effect, the "Activate firmware after download" option was not activated for the update. The bus segment must be restarted. Switch the bus link off and back on when possible.

Checking the firmware version and clearing the error memory

1. Double-click the interface module in HW Config.
   Result: SIMATIC PDM is started.
2. Check the current firmware version of each field distributor with the menu command Device > Extended fieldbus diagnostics data.
3. After the last field distributor has been updated, click the "Overwrite previous status with current status" button in the "Extended fieldbus diagnostics data" dialog to delete the errors signaled during the firmware update.
4. Select the File > Save menu command.

6.10 Disabling extended fieldbus diagnostics

When the extended fieldbus diagnostics is disabled, the communication with all field devices in the segment is temporarily interrupted.

Requirement

To disable extended fieldbus diagnostics, you need the associated STEP 7 project including SIMATIC PDM.

Disabling fieldbus diagnostics

1. In PDM, select the menu command Device > Disable extended fieldbus diagnostics.
2. Follow the on-screen instructions.
3. Save the current set topology in SIMATIC PDM with menu command File > Save.
Service and maintenance

6.10 Disabling extended fieldbus diagnostics

Additional information

- Section "Enabling/disabling extended fieldbus diagnostics at the field distributor (Page 22)"
- Section "Resetting the interface module (Page 19)"
7. Alarm, fault and system messages

7.1 Diagnostics using LED displays

7.1.1 LED displays of the interface module

The information in the DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link (http://support.industry.siemens.com/cs/document/1142696) Operating Instructions and in the supplemental Product Information for the DP/PA Coupler, ... Operating Instructions (http://support.industry.siemens.com/cs/document/105657140) applies to the LED displays of the interface module.

When the extended fieldbus diagnostics is used, the LED displays change several times during commissioning and only show the desired pattern upon completion of commissioning.

7.1.2 LED displays of the coupler

The information in the DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link (http://support.industry.siemens.com/cs/document/1142696) Operating Instructions applies to the LED displays of the coupler.

When the extended fieldbus diagnostics is used, the LED displays change several times during commissioning and only show the desired pattern upon completion of commissioning.

7.1.3 LED displays of the field distributor

The information in the DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link (http://support.industry.siemens.com/cs/document/1142696) Operating Instructions and in the supplemental Product Information for the DP/PA Coupler, ... Operating Instructions (http://support.industry.siemens.com/cs/document/105657140) applies to the LED displays of the field distributor.

When the extended fieldbus diagnostics is used, the LED displays change several times during commissioning and only show the desired pattern upon completion of commissioning.

LEDs for non-activated spur lines generally remain "off".

7.2 Diagnostics of the interface module

Use SIMATIC PDM for the diagnostics of the EFD system, see section Elimination of errors with the extended fieldbus diagnostics (Page 46).
The information on diagnostics of the interface module in the DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link (http://support.industry.siemens.com/cs/document/1142696) Operating Instructions also applies.

7.3 Diagnostics of the coupler

Use SIMATIC PDM for the diagnostics of the EFD system, see section Elimination of errors with the extended fieldbus diagnostics (Page 46).

The information on diagnostics of the coupler in the DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link (http://support.industry.siemens.com/cs/document/1142696) Operating Instructions also applies.

7.4 Elimination of errors with the extended fieldbus diagnostics

7.4.1 Overview

Causes of error and corrective measures

In the following sections, you can find the possible error causes and corrective measures for the diagnostic messages of the extended fieldbus diagnostics in the “Extended fieldbus diagnostics data” dialog for topology, coupler and field distributor.

DANGER
Observe safety information

If used in a hazardous area, you must observe the safety information in the Product Information for the operating instructions DP/PA coupler, ... (http://support.industry.siemens.com/cs/document/105657140).

Note

Take into account whether the corrective measures carried out require a restart or not. Refer to the sections Replacing components during ongoing operation (Page 31) and Replacing components with restart (Page 33).

If a corrective measure can be carried out during operation, carry it out. In this case, you can check whether it was successful by clicking the “Overwrite previous status with current status” button.
7.4 Elimination of errors with the extended fieldbus diagnostics

Note
Availability

- Only one error is allowed in the EFD system.
- If more than one error occurs:
  - The availability of the entire system can no longer be guaranteed.
  - The errors must be corrected to eliminate the fault. The EFD system must then be restarted.

Messages after voltage recovery

After a voltage recovery, EFD system messages may be triggered (e.g. due to active warning and alarm limits). Check whether the causes of the messages persist. If the EFD system is operating error-free, you can clear the error memory (see section "Manually adding/removing/replacing a field device during operation (Page 37); Clearing the error memory").

Disabled messages

Certain warning and alarm limits can be disabled using PDM.

For example, if you have disabled the limit for "Trunk Jitter Max", you will not receive messages for this physical value:

- No "Maintenance required" warnings
- No "Out of specification" alarms
Procedure

1. You must open SIMATIC PDM for the diagnostics of the EFD system.
   - If a PCS 7 Maintenance Station is present in the plant and it has access to the engineering station with SIMATIC PDM, you can open SIMATIC PDM in the case of a message related to the EFD system directly from this message.
   - You can open SIMATIC PDM via HW Config. Double-click the interface module in HW Config.

2. Select the status overview of the complete EFD system online with the menu command **Device > Extended fieldbus diagnostics data**.

3. Check the received status messages in the "Extended fieldbus diagnostics data" dialog.

![Image of online status overview of the EFD system]

Figure 7-1 Online status overview of the EFD system
Symbols for the diagnostics status signals of the extended fieldbus diagnostics

The status signals of the extended fieldbus diagnostics are displayed with the following symbols depending on the severity:

<table>
<thead>
<tr>
<th>Symbol in status overview</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>![X]</td>
<td>FAILURE: (according to Namur NE 107) E.g. component defective, short-circuit, wire break, etc.</td>
</tr>
<tr>
<td>![?]</td>
<td>Out of specification: (according to Namur NE 107) Measured value violates the high or low alarm limit specific to the device (alarm) (see &quot;Technical specifications (Page 69)&quot;; Tolerances for measured value deviations for main line and spur line)</td>
</tr>
<tr>
<td>![💦]</td>
<td>MAINTENANCE REQUIRED: (according to Namur NE 107) Measured value violates the high or low warning limit defined by the user (warning) (see &quot;Technical specifications (Page 69)&quot;; Tolerances for measured value deviations for main line and spur line)</td>
</tr>
<tr>
<td>![❗]</td>
<td>Note This action, which requires a decision, needs your attention.</td>
</tr>
<tr>
<td>![✅]</td>
<td>Diagnostics active Component is functioning properly.</td>
</tr>
</tbody>
</table>

Current status and previous status

The "Extended fieldbus diagnostics data" dialog and the lower-level dialogs for "Topology", "Coupler" and "AFDiSD" additionally display the status signals for two different states of the EFD system:

- "Actual status"
  This column displays the status of the EFD system and its components on the basis of the last monitoring cycle.

- "Previous status"
  This column displays the most serious error since the commissioning status was last set to "Completed" (by means of the "Overwrite previous status with current status" button).

These two columns help, for example, by showing an error which incurred after the last setting the commissioning status to "Completed" (= previous status: "Out of specification"), but which was no longer detected during the last monitoring cycle (= Actual status: "Diagnostics active"). This can be caused, for example, by a loose contact on a spur line.

Locating field distributors in the plant

SIMATIC PDM provides the "Find AFDiSD x" function for locating field distributors in the plant. You can find the "Find AFDiSD x" button in the "Device" area of the parameter table of the "AFDiSD x".
When you click this button, all LEDs of the spur lines to the field devices (S1 to S6) flash for 5 s on the sought-after field distributor.

Rules

- Always handle EFD alarms first.
- Work through the status overview of the EFD bus segment from top to bottom and handle the error messages in accordance with their severity. A failure can be the reason for the display of further error or maintenance required messages at the subsequent components in the bus segment. When a failure is eliminated, it is therefore possible that subsequent error displays are also eliminated.
- Deal with all the components that are identified by the "Failure" symbol first:
  - Click the respective option button to open the associated dialog of the affected component.
  - Eliminate the displayed error. For this purpose, read the information in the following sections.
  - Update the "Extended fieldbus diagnostics data" dialog by clicking the "Overwrite previous status with current status" button.
- Next, handle all error messages that are identified by the symbol "Out of specification" in the same manner.
- Finally, handle all error messages that are marked with the symbol "Maintenance required" in the same manner.
- Eliminate any further errors displayed until all the status displays are set to "Diagnostics active".
- When no more EFD alarms are displayed: Eliminate any other existing errors.

7.4.2 Topology

7.4.2.1 Topology: Eliminating the "Failure" diagnostics status

Requirement

In the "Extended fieldbus diagnostics data" dialog, one or more "Failure" diagnostics states exist for the topology.

Procedure

1. In the "Extended fieldbus diagnostics data" dialog, click the "Topology" button.
   Result: The "Topology - (online)" dialog opens.
2. Eliminate the "Failure" diagnostics status in the topology using the following table of possible error causes and corrective measures.
Causes of error and corrective measures

In the following table, you can find the possible error causes and corrective measures for the "Failure" diagnostics status in the topology of the EFD system.

DANGER

Observe safety information

If used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, ... (http://support.industry.siemens.com/cs/document/105657140) Operating Instructions.

Before starting work, disconnect the affected component from the power supply.

Table 7-2 Topology - "Failure" diagnostics status in the "Topology - (Online)" dialog

<table>
<thead>
<tr>
<th>Error in ...</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupler mode: &quot;Actual topology&quot; column</td>
<td>More couplers exist than were configured.</td>
<td>Adapt the configuration.</td>
</tr>
<tr>
<td></td>
<td>Two couplers are configured, but the redundancy modes set at the couplers do not match.</td>
<td>Set the same redundancy mode at both couplers. Check the redundancy mode in the configuration.</td>
</tr>
<tr>
<td>&quot;Set topology&quot; column: A serial number of a field distributor is entered, however not in the &quot;Actual topology&quot; column.</td>
<td>Wiring faulty, for example, wire break at the field distributor or coupler (coupler also indicates a failure)</td>
<td>Check the process wiring of the surrounding components and, if possible, eliminate the fault.</td>
</tr>
<tr>
<td></td>
<td>Component defective or missing (coupler, active field splitter (AFS), field distributor)</td>
<td>Check the higher-level components in the hierarchical structure of the bus segment for failures. Eliminate the first occurring failure. For information on replacing a defective field distributor, see section Replacing a field distributor (Page 35).</td>
</tr>
<tr>
<td>&quot;Actual topology&quot; column: A serial number of a field distributor is entered, however not in the &quot;Set topology&quot; column.</td>
<td>An additional field distributor is connected in comparison to the set topology.</td>
<td>Remove the superfluous field distributor.</td>
</tr>
<tr>
<td>Number of configured couplers</td>
<td>The permissible number of configured couplers has been exceeded.</td>
<td>Check the number of configured couplers and remove the superfluous ones.</td>
</tr>
<tr>
<td></td>
<td>Wrong bus module used.</td>
<td>Replace the bus module used with the bus module BM FDC/FDC (redundant) or correct the number of configured couplers in HW Config.</td>
</tr>
<tr>
<td>Number of connected field distributors</td>
<td>The permissible number of connected field distributors has been exceeded.</td>
<td>Check the number of connected field distributors and remove the superfluous ones.</td>
</tr>
</tbody>
</table>
7.4.2.2 Topology: Correcting the diagnostics status "Outside the specification"

Requirement

In the "Extended fieldbus diagnostics data" dialog, there is one or more "Out of specification" diagnostics states for the topology.

Procedure

1. In the "Extended fieldbus diagnostics data" dialog, click the "Topology" button. Result: The "Topology - (online)" dialog opens.
2. Eliminate the "Out of specification" diagnostics status in the topology using the following table of possible error causes and corrective measures.

Causes of error and corrective measures

In the following table, you can find the possible error causes and corrective measures for the "Out of Specification" diagnostics status in the set topology of the EFD system.

<table>
<thead>
<tr>
<th>Error in ...</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupler mode: Redundancy modes inconsistent:</td>
<td>Deviating redundancy mode detected in the plant:</td>
<td>Check the set redundancy mode on the coupler pair and the set topology in the interface module. Ensure that the set redundancy mode matches.</td>
</tr>
<tr>
<td>● &quot;Set topology&quot; column and</td>
<td>● Redundancy mode in the set topology of the EFD system in the interface module</td>
<td>● Error on the coupler: Switch off the coupler and correct the redundancy mode. Switch on the coupler</td>
</tr>
<tr>
<td>● &quot;Actual topology&quot; column</td>
<td>● Redundancy mode that is set on the coupler (&quot;RING&quot; DIP switch)</td>
<td>● No error in the settings or error persists after correction of the settings: Save the set topology again (see step 7 &quot;Manually configuring the extended fieldbus diagnostics (Page 25)&quot;).</td>
</tr>
</tbody>
</table>

Observe safety information

If used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, ... (http://support.industry.siemens.com/cs/document/105657140) Operating Instructions.

Before starting work, disconnect the affected component from the power supply.

Table 7-3 Topology - "Out of specification" diagnostics status in the "Topology - (Online)" dialog
7.4.2.3 Topology: Changing the diagnostics status "Maintenance required"

Requirement

In the "Extended fieldbus diagnostics data" dialog, there is one or more "Maintenance required" diagnostics states for the topology.

Procedure

1. In the "Extended fieldbus diagnostics data" dialog, click the "Topology" button. Result: The "Topology - (online)" dialog opens.
2. Change the "Maintenance required" diagnostics status in the topology using the following table of possible error causes and corrective measures.

Causes of error and corrective measures

In the following table, you can find the possible error causes and corrective measures for the "Maintenance required" diagnostics status in the topology of the EFD system.

<table>
<thead>
<tr>
<th>Error in</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial number of the field distributor:</td>
<td>Field distributors with different serial numbers connected.</td>
<td>You may be currently replacing a defective field distributor, see section Replacing a field distributor (Page 35).</td>
</tr>
<tr>
<td>Serial numbers in the &quot;Set topology&quot; column and &quot;Actual topology&quot; column do not match.</td>
<td></td>
<td>Replace the field distributor with the field distributor with the correct serial number.</td>
</tr>
<tr>
<td>Field distributor incorrectly wired (e.g. wrong order).</td>
<td></td>
<td>Check the process wiring.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Repeat the commissioning, see section Commissioning: EFD system (Page 19).</td>
</tr>
</tbody>
</table>

DANGER

Observe safety information

If used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, ... (http://support.industry.siemens.com/cs/document/105657140) Operating Instructions.

Before starting work, disconnect the affected component from the power supply.
7.4.3 Coupler

7.4.3.1 Coupler: Eliminating the "Failure" diagnostics status

Requirement

In the "Extended fieldbus diagnostics data" dialog, there is one or more "Failure" diagnostics states for the coupler.

Procedure

1. In the "Extended fieldbus diagnostics data" dialog, click the "Coupler 1" or "Coupler 2" button.
   Result: The "Coupler x - (online)" dialog opens.
2. Open the "Diagnostics data" dialog.
3. Eliminate the "Failure" diagnostics status for the coupler using the following table of possible error causes and corrective measures.

Causes of error and corrective measures

In the following table, you can find the possible error causes and corrective measures for the "Failure" diagnostics status for the coupler.

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-circuit</td>
<td>Short-circuit between coupler and the following field distributor</td>
<td>Check the process wiring between the coupler and the first connected field distributor, if possible, eliminate the error.</td>
</tr>
<tr>
<td>Wire break</td>
<td>Wire break between coupler and the following field distributor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The IP30 cover of the connected field distributor is open.</td>
<td>Close the IP30 cover of the connected field distributor.</td>
</tr>
</tbody>
</table>

DANGER

Observe safety information

If used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, ... (http://support.industry.siemens.com/cs/document/105657140) Operating Instructions.

Before starting work, disconnect the affected component from the power supply.
7.4.3.2 Coupler: Correcting the diagnostics status "Outside the specification"

**Requirement**

In the "Extended fieldbus diagnostics data" dialog, there is one or more "Out of specification" diagnostics states for the coupler.

**Procedure**

1. In the "Extended fieldbus diagnostics data" dialog, click the "Coupler 1" or "Coupler 2" button.
   Result: The "Coupler x - (online)" dialog opens.
2. Open the "Diagnostics data" dialog or the "Physical layer" dialog.
3. Eliminate the "Out of specification" diagnostics status for the coupler using the following table of possible error causes and corrective measures.

**Note**

The active supplying or active conducting coupler in a redundant configuration only provides a current value; the passive coupler in a redundant configuration provides only a voltage value.

**Causes of error and corrective measures**

In the following table, you can find the possible error causes and corrective measures for the "Out of specification" diagnostics status for the coupler.

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrong redundancy mode</td>
<td>Difference in redundancy mode detected between the redundancy mode set on the coupler (&quot;RING&quot; DIP switch) and the configured redundancy mode in HW Config (ring or coupler redundancy).</td>
<td>Check the set redundancy mode on the coupler pair and in the configuration. The set redundancy mode must match. Make the necessary adjustment.</td>
</tr>
</tbody>
</table>

**DANGER**

**Observe safety information**

If used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, ... ([http://support.industry.siemens.com/cs/document/105657140](http://support.industry.siemens.com/cs/document/105657140)) Operating Instructions.

Before starting work, disconnect the affected component from the power supply.
### 7.4 Elimination of errors with the extended fieldbus diagnostics

#### Table 7-7

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupler voltage below the set warning limit</td>
<td>Wrong cable</td>
<td>Check the cable type.</td>
</tr>
<tr>
<td></td>
<td>Terminal resistance is too high (corrosion, missing screw)</td>
<td>Check the terminal resistors.</td>
</tr>
<tr>
<td></td>
<td>Cable too long (cable resistance to high)</td>
<td>Check the configuration of the bus segment with the SIMATIC Fieldbus Calculator (<a href="http://support.industry.siemens.com/cs/document/53842953">http://support.industry.siemens.com/cs/document/53842953</a>).</td>
</tr>
<tr>
<td>Coupler voltage above the set warning limit</td>
<td>Defective coupler</td>
<td>Check the coupler and replace it, if necessary.</td>
</tr>
<tr>
<td>Coupler current above the set warning limit</td>
<td>Cable error</td>
<td>Check the wiring of the bus segment for a resistive load between &quot;+&quot; and &quot;-&quot;.</td>
</tr>
<tr>
<td></td>
<td>Too many devices connected to bus segment</td>
<td>Check the configuration of the bus segment with the SIMATIC Fieldbus Calculator (<a href="http://support.industry.siemens.com/cs/document/53842953">http://support.industry.siemens.com/cs/document/53842953</a>). Check if too many devices are connected to the bus segment and remove some, if necessary.</td>
</tr>
</tbody>
</table>

#### See also

- Technical specifications (Page 69)
- Fieldbus Calculator (http://support.industry.siemens.com/cs/document/53842953)

#### 7.4.3.3 Coupler: Changing the diagnostics status "Maintenance required"

#### Requirement

In the "Extended fieldbus diagnostics data" dialog, there is one or more "Maintenance required" diagnostics states for the coupler.

#### Procedure

1. In the "Extended fieldbus diagnostics data" dialog, click the "Coupler 1" or "Coupler 2" button.
   Result: The "Coupler x - (online)" dialog opens.
2. Open the "Physical layer" dialog.
3. Change the "Maintenance required" diagnostics status for the coupler using the following table of possible error causes and corrective measures.
Causes of error and corrective measures

In the following table, you can find the possible error causes and corrective measures for the "Maintenance required" diagnostics status for the coupler.

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupler voltage below the set warning limit</td>
<td>Current consumption of the field distributors or field devices has changed. This may indicate imminent failure of the field distributor or field device.</td>
<td>Check the current consumption of the field distributors and the field devices (see section Field distributor: Correcting the diagnostics status &quot;Out of specification&quot; (Page 59)). Replace the affected field distributor or field device, if necessary.</td>
</tr>
<tr>
<td>Coupler current below the set warning limit</td>
<td>Current consumption of the field distributors or field devices has changed. This may indicate imminent failure of the field distributor or field device.</td>
<td>Check the current consumption of the field distributors and the field devices (see section Field distributor: Correcting the diagnostics status &quot;Out of specification&quot; (Page 59)). Replace the affected field distributor or field device, if necessary.</td>
</tr>
<tr>
<td>Coupler current above the set warning limit</td>
<td>Current consumption of the field distributors or field devices has changed. This may indicate imminent failure of the field distributor or field device.</td>
<td>Check the current consumption of the field distributors and the field devices (see section Field distributor: Correcting the diagnostics status &quot;Out of specification&quot; (Page 59)). Replace the affected field distributor or field device, if necessary.</td>
</tr>
</tbody>
</table>

Before starting work, disconnect the affected component from the power supply.

Table 7-8 Coupler - "Maintenance required" diagnostics status in the "Coupler x - (Online)" > "Physical Layer" dialog

See also

Technical specifications (Page 69)
7.4.4 Field distributor

7.4.4.1 Field distributor: Eliminating the "Failure" diagnostics status

Requirement
In the "Extended fieldbus diagnostics data" dialog, there is one or more "Failure" diagnostics states for a field distributor.

Locating field distributors in the plant
SIMATIC PDM provides the "Find AFDiSD x" function for locating field distributors in the plant. You can find the "Find AFDiSD x" button in the "Device" area of the parameter table of the "AFDiSD x".

When you click this button, all LEDs of the spur lines to the field devices (S1 to S6) flash for 5 s on the sought-after field distributor.

Procedure
1. In the "Extended fieldbus diagnostics data" dialog, click the "AFDiSD x" button.
   Result: The "AFDiSD x - (online)" dialog opens.
2. Select the "Main line" dialog or the "Spur line" dialog.
3. Eliminate the "Failure" diagnostics status for the field distributor using the following table of possible error causes and corrective measures.

Causes of error and corrective measures
In the following table, you can find the possible error causes and corrective measures for the "Failure" diagnostics status for the field distributor.

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observe safety information</td>
</tr>
<tr>
<td>If used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, ... (<a href="http://support.industry.siemens.com/cs/document/105657140">http://support.industry.siemens.com/cs/document/105657140</a>) Operating Instructions.</td>
</tr>
</tbody>
</table>
Before starting work, disconnect the affected component from the power supply.

### Table 7-9

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire break</td>
<td>Wire break on a specified main line</td>
<td>Check the cable of the affected main line and the connection in the field distributor or adjacent components for faults.</td>
</tr>
<tr>
<td></td>
<td>The IP30 cover of the adjacent field distributor is open.</td>
<td>Check if the IP30 cover of the adjacent field distributor is open.</td>
</tr>
<tr>
<td></td>
<td>Field distributor is not working properly because supply voltage has fallen below the physical limit</td>
<td>Check the wiring of the bus segment with the SIMATIC Fieldbus Calculator (<a href="http://support.industry.siemens.com/cs/document/53842953">http://support.industry.siemens.com/cs/document/53842953</a>).</td>
</tr>
<tr>
<td>Short-circuit</td>
<td>Short-circuit on a specified main line</td>
<td>Check the cable of the affected main line and the connection in the field distributor or adjacent components for faults.</td>
</tr>
<tr>
<td></td>
<td>Field distributor is not working properly because supply voltage has fallen below the physical limit</td>
<td>Check the wiring of the bus segment with the SIMATIC Fieldbus Calculator (<a href="http://support.industry.siemens.com/cs/document/53842953">http://support.industry.siemens.com/cs/document/53842953</a>).</td>
</tr>
<tr>
<td>Cover open</td>
<td>The IP30 cover of the specified main line is open.</td>
<td>Close the IP 30 cover.</td>
</tr>
</tbody>
</table>

### Table 7-10

<table>
<thead>
<tr>
<th>Error in ...</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire break</td>
<td>Spur line cable is not attached correctly to the screw terminal.</td>
<td>Check the connection of the affected spur line cable.</td>
</tr>
<tr>
<td>Field device disconnect from spur line</td>
<td></td>
<td>Connect the field device again to the spur line.</td>
</tr>
<tr>
<td>Wire break on a specified spur line</td>
<td></td>
<td>Check the cable of the affected spur line for faults.</td>
</tr>
<tr>
<td>Terminal resistance is too high (corrosion, missing screw)</td>
<td></td>
<td>Check the terminal resistance of the affected field distributor spur line.</td>
</tr>
<tr>
<td>Short-circuit</td>
<td>Spur line cable is not attached correctly to the screw terminal.</td>
<td>Check the connection of the affected spur line cable.</td>
</tr>
<tr>
<td>Short-circuit on a specified spur line</td>
<td></td>
<td>Check the cable of the affected spur line for faults.</td>
</tr>
<tr>
<td>Power consumption of a field device is too high for the spur line.</td>
<td></td>
<td>Verify that the power consumption of the field device is within the allowable range of the spur line.</td>
</tr>
<tr>
<td>Connected field device is defective</td>
<td></td>
<td>Replace the defective field device.</td>
</tr>
</tbody>
</table>

### 7.4.4.2 Field distributor: Correcting the diagnostics status "Out of specification"

#### Requirement

In the "Extended fieldbus diagnostics data" dialog, there is one or more "Out of specification" diagnostics states for a field distributor.
Locating active field distributors in the plant

SIMATIC PDM provides the "Find AFDiSD x" function for locating active field distributors in the plant.
You can find the "Find AFDiSD x" button in the "Device" area of the parameter table of the "AFDiSD x".

When you click this button, all LEDs of the spur lines to the field devices (S1 to S6) flash for 5 s on the sought-after field distributor.

Procedure

1. In the "Extended fieldbus diagnostics data" dialog, click the "AFDiSD x" button.
   Result: The "AFDiSD x - (online)" dialog opens.
2. Select the "Main line" dialog or the "Spur line" dialog.
3. Eliminate the "Out of specification" diagnostics status for the field distributor using the following table of possible error causes and corrective measures.

Note

To localize the faults (signal level, capacitive unbalance, signal noise) shown in the "Main line - General" dialog, you must check all parts of the main line for unknown devices or faulty wiring.

Causes of error and corrective measures

In the following table, you can find the possible error causes and corrective measures for the "Out of specification" diagnostics status for the field distributor:

<table>
<thead>
<tr>
<th>DANGER</th>
<th>Observe safety information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, ... (<a href="http://support.industry.siemens.com/cs/document/105657140">http://support.industry.siemens.com/cs/document/105657140</a>) Operating Instructions.</td>
</tr>
</tbody>
</table>
Before starting work, disconnect the affected component from the power supply.

### Table 7-11: "Out of specification" diagnostics status in the "AFDiSD x - (online)" > "Main line" - T1 or T2 dialog

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage values of the segment below the set warning limit</td>
<td>Cable too long (cable resistance to high)</td>
<td>Check the configuration of the bus segment with the SIMATIC Fieldbus Calculator (<a href="http://support.industry.siemens.com/cs/document/53842953">http://support.industry.siemens.com/cs/document/53842953</a>).</td>
</tr>
<tr>
<td>Wrong cable</td>
<td></td>
<td>Check the cable type (see Cable types in the technical specifications of the field distributor in the Product information for the DP/PA coupler, ... Operating Instructions (<a href="http://support.industry.siemens.com/cs/document/105657140">http://support.industry.siemens.com/cs/document/105657140</a>)).</td>
</tr>
<tr>
<td>Field distributors or field devices were added to the end of the bus segment.</td>
<td></td>
<td>Check the configuration of the bus segment with the SIMATIC Fieldbus Calculator (<a href="http://support.industry.siemens.com/cs/document/53842953">http://support.industry.siemens.com/cs/document/53842953</a>) and remove the superfluous field distributors and field devices.</td>
</tr>
<tr>
<td>Voltage values of the segment above the set warning limit</td>
<td>Defective coupler</td>
<td>Check the coupler of the affected field distributor and replace it, if necessary.</td>
</tr>
<tr>
<td>Current values of the segment above the set warning limit</td>
<td>Too many devices on bus segment</td>
<td>Check if too many devices are connected to the bus segment and remove them.</td>
</tr>
<tr>
<td>Unknown device connected to bus segment or faulty wiring</td>
<td></td>
<td>Check the environment of the field distributor for unknown devices on the bus segment (e.g. resistive load between &quot;+&quot; and &quot;+-&quot;).</td>
</tr>
</tbody>
</table>
### Table 7-12: "Out of specification" diagnostics status in the "AFDiSD x - (online)" > "Main line" - General" dialog

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode selector</td>
<td>The mode selector of the field distributor was switched to the wrong mode during operation.</td>
<td>Check the mode selector switch of the field distributor and set it to diagnostics mode (switch position = &quot;D&quot;), see section Enabling/disabling extended fieldbus diagnostics at the field distributor (Page 22).</td>
</tr>
<tr>
<td>Signal level too low</td>
<td>Too many termination resistors on the bus segment</td>
<td>Remove unnecessary termination resistors.</td>
</tr>
<tr>
<td></td>
<td>Terminal resistance is too high (corrosion, missing screw)</td>
<td>Check the terminal resistance of the affected field distributor and, if necessary, of the adjacent field distributor.</td>
</tr>
<tr>
<td>Wrong cable</td>
<td></td>
<td>Check the cable type (see Cable types in the technical specifications of the field distributor in the Product information for the DP/PA coupler, ... Operating Instructions [<a href="http://support.industry.siemens.com/cs/document/105657140">http://support.industry.siemens.com/cs/document/105657140</a>]).</td>
</tr>
<tr>
<td></td>
<td>Cable too long (cable resistance too high)</td>
<td>Check the configuration of the bus segment with the SIMATIC Fieldbus Calculator [<a href="http://support.industry.siemens.com/cs/document/J53842353">http://support.industry.siemens.com/cs/document/J53842353</a>].</td>
</tr>
<tr>
<td>Signal level too high</td>
<td>Too few termination resistors on the bus segment</td>
<td>Check the coupler to determine if the bus terminator switch is set correctly.</td>
</tr>
<tr>
<td>Wrong cable</td>
<td></td>
<td>Check the cable type (see Cable types in the technical specifications of the field distributor in the Product information for the DP/PA coupler, ... Operating Instructions [<a href="http://support.industry.siemens.com/cs/document/105657140">http://support.industry.siemens.com/cs/document/105657140</a>]).</td>
</tr>
<tr>
<td>Field distributor defective</td>
<td></td>
<td>Replace the last field distributor on the line.</td>
</tr>
<tr>
<td>Capacitive unbalance to ground of all field distributors is too low or too high</td>
<td>Short-circuit between &quot;-&quot; or &quot;+&quot; main line to shield</td>
<td>Check the wiring in the bus segment in question and the shield connection of the field distributor enclosure.</td>
</tr>
<tr>
<td></td>
<td>Cable is damaged, water has penetrated (can sometimes result in an error display in &quot;Previous state&quot; column).</td>
<td>Check the wiring in the affected bus segment for damage.</td>
</tr>
<tr>
<td></td>
<td>Water has penetrated the field distributor.</td>
<td>Check the field distributor enclosure for water.</td>
</tr>
<tr>
<td></td>
<td>Shield in the coupler is not correctly connected.</td>
<td>Check the shield connection of the coupler.</td>
</tr>
<tr>
<td></td>
<td>Wrong cable</td>
<td>Check the cable type (see Cable types in the technical specifications of the field distributor in the Product information for the DP/PA coupler, ... Operating Instructions [<a href="http://support.industry.siemens.com/cs/document/105657140">http://support.industry.siemens.com/cs/document/105657140</a>]).</td>
</tr>
</tbody>
</table>
### Capacitive unbalance to ground of one or more of field distributors differs from the other field distributors.

Possible causes of error: Shield in the field distributor is not correctly connected.
Corrective measures: Check the shield connection of the cable between the field distributors that have a different capacitive unbalance.

Possible causes of error: Shield between two field distributors is interrupted.
Corrective measures: Check the cable between the field distributors that have a different capacitive unbalance for damage.

### Signal noise too high

Possible causes of error: Interference on the bus segment
Corrective measures: Check if there are sources of interference in proximity to the bus segment.

Possible causes of error: Insufficient shielding
Corrective measures: Check the shield connection of the cable in the couplers.
Check the shield connection of the cable in the field distributor.
Check the ground connection of the field distributors.

### Wrong cable

Possible causes of error: Check the cable type (see Cable types in the technical specifications of the field distributor in the Product information for the DP/PA coupler, ... Operating Instructions (http://support.industry.siemens.com/cs/document/105657140)).

Possible causes of error: Cable is damaged.
Corrective measures: Check the cable for damage.

### Voltage values of the spur line too low

Possible causes of error: Power consumption of a field device is at the high limit for the spur line.
Corrective measures: Verify that the power consumption of the field device is within the allowable range of the spur line.

Possible causes of error: Unknown device connected to the spur line or faulty wiring
Corrective measures: Check the spur line for unknown devices (e.g. resistive load between "+" and "+").

### Voltage values of the spur line too high

Possible causes of error: Field distributor defective
Corrective measures: Replace the defective field distributor.

### Current values of the spur line too low

Possible causes of error: Field device defective
Corrective measures: Replace the defective field device.

### Current values of the spur line too high

Possible causes of error: Power consumption of a field device is at the high limit for the spur line.
Corrective measures: Verify that the power consumption of the field device is within the allowable range of the spur line.

Possible causes of error: Unknown device connected to the spur line or faulty wiring
Corrective measures: Check the spur line for unknown devices (e.g. resistive load between "+" and "+").

### See also

- Technical specifications (Page 69)
- PI amendments for OI DP/PA Link,... (http://support.industry.siemens.com/cs/document/105657140)
7.4.4.3 Field distributor: Changing the diagnostics status "Maintenance required"

Requirement

In the "Extended fieldbus diagnostics data" dialog, there is one or more "Maintenance required" diagnostics states for a field distributor.

Locating field distributors in the plant

SIMATIC PDM provides the "Find AFDiSD x" function for locating field distributors in the plant. You can find the "Find AFDiSD x" button in the "Device" area of the parameter table of the "AFDiSD x".

When you click this button, all LEDs of the spur lines to the field devices (S1 to S6) flash for 5 s on the sought-after field distributor.

Procedure

1. In the "Extended fieldbus diagnostics data" dialog, click the "AFDiSD x" button.
   Result: The "AFDiSD x - (online)" dialog opens.
2. Select the "Main line" dialog or the "Spur line" dialog.
3. Change the "Maintenance required" diagnostics status for the field distributor using the following table of possible error causes and corrective measures.

Note

To localize the faults (signal level, capacitive unbalance, signal noise) shown in the "Main line - General" dialog, you must check all parts of the main line for unknown devices or faulty wiring.

Causes of error and corrective measures

In the following table, you can find the possible error causes and corrective measures for the "Maintenance required" diagnostics status for the field distributor.

<table>
<thead>
<tr>
<th>Causes of error and corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the following table, you can find the possible error causes and corrective measures for the &quot;Maintenance required&quot; diagnostics status for the field distributor.</td>
</tr>
</tbody>
</table>

DANGER

Observe safety information

If used in a hazardous area, you must observe the safety information in the Product Information for the DP/PA Coupler, ... (http://support.industry.siemens.com/cs/document/105657140) Operating Instructions.
### Table 7-14
Table 1: "Maintenance required" diagnostics status in the "AFDiSD x - (online)" > "Main line" - T1 or T2 dialog

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage values of the segment below the set warning limit</td>
<td>Additional field distributors or field devices were added to the bus segment.</td>
<td>Remove the additional devices or save the set topology again (see step 7 &quot;Manually configuring the extended fieldbus diagnostics (Page 25)&quot;).</td>
</tr>
<tr>
<td></td>
<td>Cable length changed when last serviced</td>
<td>Save the set topology again (see step 7 &quot;Manually configuring the extended fieldbus diagnostics (Page 25)&quot;).</td>
</tr>
<tr>
<td></td>
<td>Terminal resistance is too high (corrosion, missing screw)</td>
<td>Check the terminal resistance of the affected field distributor and, if necessary, of the adjacent field distributor.</td>
</tr>
<tr>
<td>Voltage values of the segment above the set warning limit</td>
<td>Cable length changed when last serviced</td>
<td>Save the set topology again (see step 7 &quot;Manually configuring the extended fieldbus diagnostics (Page 25)&quot;).</td>
</tr>
<tr>
<td>Current values of the segment below the set warning limit</td>
<td>Current consumption of the field distributors or field devices has changed. This may indicate imminent failure of the field distributor or field device.</td>
<td>Replace the affected field distributor or field device.</td>
</tr>
<tr>
<td>Current values of the segment above the set warning limit</td>
<td>Additional field distributors or field devices were added to the bus segment.</td>
<td>Check if additional field distributors or field devices were added to the bus segment. Remove these or save the set topology again (see step 7 &quot;Manually configuring the extended fieldbus diagnostics (Page 25)&quot;).</td>
</tr>
<tr>
<td></td>
<td>Unknown device connected to bus segment or faulty wiring</td>
<td>Check the environment of the field distributor for unknown devices on the bus segment (e.g. resistive load between &quot;+&quot; and &quot;-&quot;).</td>
</tr>
<tr>
<td></td>
<td>Current consumption of the field distributors or field devices has changed. This may indicate imminent failure of the field distributor or field device.</td>
<td>Replace the affected field distributor or field device.</td>
</tr>
</tbody>
</table>

### Table 7-15
Table 2: "Maintenance required" diagnostics status in the "AFDiSD x - (online)" > "Main line" - General dialog

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal level below the set warning limit</td>
<td>Unnecessary terminating resistors were added to the bus segment.</td>
<td>Remove unnecessary termination resistors.</td>
</tr>
<tr>
<td></td>
<td>Terminal resistance is too high (corrosion, missing screw)</td>
<td>Check the terminal resistors.</td>
</tr>
<tr>
<td></td>
<td>Cable length changed</td>
<td>Save the set topology again (see step 7 &quot;Manually configuring the extended fieldbus diagnostics (Page 25)&quot;).</td>
</tr>
<tr>
<td>Signal level above the set warning limit</td>
<td>Terminal resistance is too high (corrosion, missing screw)</td>
<td>Check the terminal resistors.</td>
</tr>
<tr>
<td></td>
<td>Bus terminator switch on coupler disconnected</td>
<td>Check the coupler to determine if the bus terminator switch is set to ON.</td>
</tr>
<tr>
<td></td>
<td>Cable length changed</td>
<td>Save the set topology again (see step 7 &quot;Manually configuring the extended fieldbus diagnostics (Page 25)&quot;).</td>
</tr>
</tbody>
</table>
### 7.4 Elimination of errors with the extended fieldbus diagnostics

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitive unbalance to ground below the set warning limit</td>
<td>Short-circuit &quot;-&quot; main line to shield occurred at last servicing</td>
<td>Check the wiring in the bus segment in question and the shield connection of the field distributor enclosure.</td>
</tr>
<tr>
<td></td>
<td>Cable is damaged or water has penetrated.</td>
<td>Check the wiring in the affected bus segment for damage.</td>
</tr>
<tr>
<td></td>
<td>Water has penetrated the field distributor.</td>
<td>Check the field distributor enclosure for water.</td>
</tr>
<tr>
<td>Capacitive unbalance to ground above the set warning limit</td>
<td>Short-circuit &quot;+&quot; main line to shield occurred at last servicing</td>
<td>Check the wiring in the bus segment in question and the shield connection of the field distributor enclosure.</td>
</tr>
<tr>
<td></td>
<td>Water has penetrated the cable, &quot;+&quot; main line damaged.</td>
<td>Check the wiring in the affected bus segment for damage.</td>
</tr>
<tr>
<td></td>
<td>Water has penetrated the field distributor.</td>
<td>Check the field distributor enclosure for water.</td>
</tr>
<tr>
<td>Signal noise above the set warning limit</td>
<td>Field distributor or field device is emitting signal noise on the bus segment. This may indicate imminent failure of the field distributor or field device.</td>
<td>Replace the interfering field distributor or field device.</td>
</tr>
<tr>
<td></td>
<td>Interference on the bus segment</td>
<td>Check if there are sources of interference in proximity to the bus segment.</td>
</tr>
<tr>
<td></td>
<td>Insufficient shielding at last serviced</td>
<td>Check the shield connection of the cable in the couplers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check the shield connection of the cable in the field distributor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check the ground connection of the field distributors.</td>
</tr>
<tr>
<td></td>
<td>Cable is damaged.</td>
<td>Check the cable for damage.</td>
</tr>
<tr>
<td></td>
<td>Tolerance for measured value deviations when voltage noise is present is too low.</td>
<td>Increase the allowable tolerance for measured value deviations when voltage noise is present, see section Technical specifications (Page 69).</td>
</tr>
</tbody>
</table>

### Table 7-16 Table 3: "Maintenance required" diagnostics status in the "AFDI SD x (online)" > "Spur line" - S1 - S6 dialog

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage values of the spur line below the set warning limit</td>
<td>Unknown device at last servicing connected to the spur line or faulty wiring</td>
<td>Check the spur line for unknown devices (e.g. resistive load between &quot;+&quot; and &quot;+&quot;).</td>
</tr>
<tr>
<td></td>
<td>Field device was replaced with wrong device at last servicing.</td>
<td>Check if a permissible field device is connected to bus segment.</td>
</tr>
<tr>
<td>Voltage values of the spur line above the set warning limit</td>
<td>Field device was replaced with wrong device at last servicing.</td>
<td>Check if a permissible field device is connected to bus segment.</td>
</tr>
<tr>
<td>Current values of the spur line below the set warning limit</td>
<td>Current consumption of the field distributors or field devices has changed. This may indicate imminent failure of the field distributor or field device.</td>
<td>Replace the affected field distributor or field device.</td>
</tr>
<tr>
<td></td>
<td>Field device was replaced with wrong device at last servicing.</td>
<td>Check if a permissible field device is connected to bus segment.</td>
</tr>
</tbody>
</table>
### 7.4 Elimination of errors with the extended fieldbus diagnostics

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes of error</th>
<th>Corrective measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current values of the spur line above the set warning limit</td>
<td>Current consumption of the field distributors or field devices has changed. This may indicate imminent failure of the field distributor or field device.</td>
<td>Replace the affected field distributor or field device.</td>
</tr>
<tr>
<td></td>
<td>Field device was replaced with wrong device at last servicing.</td>
<td>Check if a permissible field device is connected to bus segment.</td>
</tr>
</tbody>
</table>
Alarm, fault and system messages

7.4 Elimination of errors with the extended fieldbus diagnostics
Technical specifications

Reference

General technical specifications

The statements in the operating instructions DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link (http://support.industry.siemens.com/cs/document/1142696) apply in regard to the general technical specifications.

Technical specifications of components

Also read the supplemental Product Information for the operating instructions DP/PA Coupler, ... (http://support.industry.siemens.com/cs/document/105657140). There you can find the technical specifications of the components:

- Interface module (IM 153-2)
- Coupler (FDC 157)
- Field distributor (AFDiSD)

Note the information in the preface on the scope of validity of this documentation: "Preface (Page 5)"

Tolerances for measured value deviations for main line and spur line

Table 8-1  Main line

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Fixed alarm limit</th>
<th>User-defined warning limit, default setting</th>
<th>Setting range, user-defined warning limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trunk Voltage Min</td>
<td>16 V</td>
<td>20 V</td>
<td>16 V – 32 V</td>
</tr>
<tr>
<td>Trunk Current Deviation</td>
<td>1000 mA</td>
<td>20 %</td>
<td>0 % – 100 %</td>
</tr>
<tr>
<td>Trunk Signal Voltage Max</td>
<td>2000 mV</td>
<td>1200 mV</td>
<td>500 mV – 2000 mV</td>
</tr>
<tr>
<td>Trunk Signal Voltage Min</td>
<td>500 mV</td>
<td>600 mV</td>
<td>500 mV – 2000 mV</td>
</tr>
<tr>
<td>Trunk Voltage Noise Max</td>
<td>150 mV</td>
<td>50 mV</td>
<td>0 mV – 150 mV</td>
</tr>
<tr>
<td>Trunk Unbalance Max 2)</td>
<td>85 %</td>
<td>50 %</td>
<td>0 % – 85 %</td>
</tr>
<tr>
<td>Trunk Unbalance Min 2)</td>
<td>-85 %</td>
<td>-50 %</td>
<td>-85 % – 0 %</td>
</tr>
<tr>
<td>Trunk Jitter Max (Abs)</td>
<td>5 µs</td>
<td>2.4 µs</td>
<td>0 µs – 5 µs</td>
</tr>
</tbody>
</table>

1) Note possible deviations according to IEC 61158-2.

2) This measurement can be disregarded for line lengths < 20 m. Recommendation: In this case, increase the warning limit.

3) Deviation from the measured value of commissioning (not from the alarm value)
### Table 8-2  Spur line

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Fixed alarm limit</th>
<th>User-defined warning limit, default setting</th>
<th>Setting range, user-defined warning limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spur Voltage Min</td>
<td>10 V</td>
<td>11 V</td>
<td>10 V – 15 V</td>
</tr>
<tr>
<td>Spur Current Deviation</td>
<td>&lt; 5 mA(^1)</td>
<td>20 %(^3)</td>
<td>0 % - 100 %(^3)</td>
</tr>
<tr>
<td></td>
<td>&gt; 37 mA (&gt; 55 mA)(^2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) A current flow < 5 mA is interpreted as a wire break.
2) The alarm limit > 55 mA is permanently set on the first spur line.
3) Deviation from the measured value of commissioning (not from the alarm value)
Appendix

A.1 Article numbers

Reference

The statements in the operating instructions DP/PA Coupler, Active Field Distributors, DP/PA Link and Y Link (http://support.industry.siemens.com/cs/document/1142696) apply in regard to the accessories for PROFIBUS DP and PROFIBUS PA.

Components of the EFD system

Table A-1 Article numbers for the components of the EFD system

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
<th>Article number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EFD-enabled components:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IM 153-2 Outdoor</td>
<td>Interface module</td>
<td>6ES7153-2BA70-0XB0</td>
</tr>
<tr>
<td>FDC 157</td>
<td>Coupler</td>
<td>6ES7157-0AC85-0XA0</td>
</tr>
<tr>
<td>AFDiSD</td>
<td>Field distributor</td>
<td>6ES7655-5DX60-1BB0</td>
</tr>
<tr>
<td><strong>Standard components:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BM PS/IM</td>
<td>Bus module</td>
<td>6ES7195-7HA00-0XA0</td>
</tr>
<tr>
<td>BM PS/IM SIPLUS extreme</td>
<td>Bus module</td>
<td>6AG1195-7HA00-2XA0</td>
</tr>
<tr>
<td>BM IM/IM</td>
<td>Bus module</td>
<td>6ES7195-7HD10-0XA0</td>
</tr>
<tr>
<td>BM IM/IM Outdoor</td>
<td>Bus module</td>
<td>6ES7195-7HD80-0XA0</td>
</tr>
<tr>
<td>BM FDC</td>
<td>Bus module</td>
<td>6ES7195-7HF80-0XA0</td>
</tr>
<tr>
<td>BM FDC/FDC (redundant)</td>
<td>Bus module</td>
<td>6ES7195-7HG80-0XA0</td>
</tr>
<tr>
<td>AFS</td>
<td>Active field splitter for coupler redundancy</td>
<td>6ES7157-0AG80-0XA0</td>
</tr>
</tbody>
</table>

Installation accessories

Table A-2 Article numbers for installation accessories

<table>
<thead>
<tr>
<th>Component</th>
<th>Article number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting rail for the &quot;module exchange in operation&quot; function</td>
<td></td>
</tr>
<tr>
<td>• 482.6 mm</td>
<td>6ES7195-1GA00-0XA0</td>
</tr>
<tr>
<td>• 530 mm</td>
<td>6ES7195-1GF30-0XA0</td>
</tr>
<tr>
<td>• 620 mm</td>
<td>6ES7195-1GG30-0XA0</td>
</tr>
<tr>
<td>• 2000 mm</td>
<td>6ES7195-1GC00-0XA0</td>
</tr>
<tr>
<td>Bus connector for S7 mounting rail (accompanies each coupler)</td>
<td>6ES7390-0AA00-0AA0</td>
</tr>
</tbody>
</table>
### A.1 Article numbers

<table>
<thead>
<tr>
<th>Component</th>
<th>Article number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covers (included are 4 backplane bus covers and 1 bus module cover)</td>
<td>6ES7195-1JA00-0XA0</td>
</tr>
<tr>
<td>Sealing plugs for unused connections on field distributors (AFDxxx)</td>
<td>6ES7157-0AG80-1XA1, 6ES7157-0AG80-1XA5</td>
</tr>
</tbody>
</table>

Table A-3  Accessories from WISKA:

<table>
<thead>
<tr>
<th>Component / thread</th>
<th>WISKA type designation</th>
<th>WISKA order designation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPRINT ATEX cable glands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• M 16x1,5 (AFDiSD)</td>
<td>ESKE/1-i 16 (old designation: ESKE-i 16)</td>
<td>10103372 (old designation: 10064411)</td>
</tr>
<tr>
<td>• M 20x1,5 (AFDiSD)</td>
<td>ESKE/1-e 20 (old designation: ESKE-2 20)</td>
<td>10103365 (old designation: 10064402)</td>
</tr>
<tr>
<td>• M 16x1,5 (AFD4/8, AFS)</td>
<td>ESKE/1-e 16 (old designation: ESKE-e 16)</td>
<td>10103364 (old designation: 10064401)</td>
</tr>
<tr>
<td><strong>Screw plugs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• M 16x1,5</td>
<td>EVSG 16</td>
<td>10061831</td>
</tr>
<tr>
<td>• M 20x1,5</td>
<td>EVSG 20</td>
<td>10061832</td>
</tr>
<tr>
<td><strong>Connection thread gaskets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• M 16x1,5</td>
<td>EADR 16</td>
<td>10062802</td>
</tr>
<tr>
<td>• M 20x1,5</td>
<td>EADR 20</td>
<td>10062803</td>
</tr>
</tbody>
</table>
The unmatched complete service for the entire life cycle

For machine constructors, solution providers and plant operators: The service offering from Siemens Industry Automation and Drive Technologies includes comprehensive services for a wide range of different users in all sectors of the manufacturing and process industry.

To accompany our products and systems, we offer integrated and structured services that provide valuable support in every phase of the life cycle of your machine or plant – from planning and implementation through commissioning as far as maintenance and modernization.

Our Service & Support accompanies you worldwide in all matters concerning automation and drive technology from Siemens. We provide direct on-site support in more than 100 countries through all phases of the life cycle of your machines and plants.

You have an experienced team of specialists at your side to provide active support and bundled know-how. Regular training courses and intensive contact among our employees – even across continents – ensure reliable service in the most diverse areas.

Online Support

The comprehensive online information platform supports you in all aspects of our Service & Support at any time and from any location in the world.

You can find Online Support on the Internet at the following address: Internet.
Appendix

A.2 Service & Support

Technical Consulting
Support in planning and designing your project: From detailed actual-state analysis, definition of the goal and consultation on product and system questions right through to the creation of the automation solution.

Technical Support
Expert advice on technical questions with a wide range of demand-optimized services for all our products and systems.
You can find Technical Support on the Internet at the following address: Internet.

Training
Extend your competitive edge – through practical know-how directly from the manufacturer.
You can find the training courses we offer on the Internet at the following address: Internet.

Engineering Support
Support during project engineering and development with services fine-tuned to your requirements, from configuration through to implementation of an automation project.

Field Service
Our Field Service offers you services for commissioning and maintenance – to ensure that your machines and plants are always available.

Spare parts
In every sector worldwide, plants and systems are required to operate with constantly increasing reliability. We will provide you with the support you need to prevent a standstill from occurring in the first place: with a worldwide network and optimum logistics chains.

Repairs
Downtimes cause problems in the plant as well as unnecessary costs. We can help you to reduce both to a minimum – with our worldwide repair facilities.

Optimization
During the service life of machines and plants, there is often a great potential for increasing productivity or reducing costs.
To help you achieve this potential, we are offering a complete range of optimization services.
Modernization

You can also rely on our support when it comes to modernization – with comprehensive services from the planning phase all the way to commissioning.

Service programs

Our service programs are selected service packages for an automation and drives system or product group. The individual services are coordinated with each other to ensure smooth coverage of the entire life cycle and support optimum use of your products and systems.

The services of a Service Program can be flexibly adapted at any time and used separately.

Examples of service programs:

- Service contracts
- Plant IT Security Services
- Life Cycle Services for Drive Engineering
- SIMATIC PCS 7 Life Cycle Services
- SINUMERIK Manufacturing Excellence
- SIMATIC Remote Support Services

Advantages at a glance:

- Reduced downtimes for increased productivity
- Optimized maintenance costs due to a tailored scope of services
- Costs that can be calculated and therefore planned
- Service reliability due to guaranteed response times and spare part delivery times
- Customer service personnel will be supported and relieved of additional tasks
- Comprehensive service from a single source, fewer interfaces and greater expertise

Contact

At your service locally, around the globe: your partner for consultation, sales, training, service, support, spare parts... for the entire range of products supplied by Industry Automation and Drive Technologies.

You can find your personal contact in our contacts database at: Internet.
Appendix

A.2 Service & Support
Glossary

Actual topology
Topology of the EFD system in the plant.
See Set topology.

Actual values from commissioning
See Set topology.

Bus
A common transfer route to which all nodes are connected; it has two defined ends.

Bus connector
Physical connection between bus node and bus line.

Coupler
The Field Device Coupler connects a PROFIBUS PA segment to a PROFIBUS DP segment. PROFIBUS PA and PROFIBUS DP are coupled to one another in terms of data but are separate in terms of the transmission physics.

Diagnostic interrupt
Diagnostics-capable components report system errors they have detected to the central CPU by means of diagnostic interrupts.
In SIMATIC S7: When an error is detected or disappears (e.g. wire break), provided the interrupt is enabled, the module initiates a diagnostic interrupt. The CPU interrupts the processing of the user program and lower priority classes and processes the diagnostic interrupt block (OB 82).

Diagnostics
Diagnostics is the detection, localisation, classification, display and further evaluation of errors, faults and messages.
Diagnostics provides monitoring functions that run automatically while the plant is in operation. This increases the availability of plants by reducing commissioning times and downtimes.

DP master
A master that behaves in conformity with IEC 61784-1:2002 Ed1 CP 3/1 is termed a DP master.
**DP slave**

A slave that is operated on the PROFIBUS bus with the PROFIBUS DP protocol and that behaves in conformity with IEC 61784-1:2002 Ed1 CP 3/1 is termed a DP slave.

**DP standard**

is the bus protocol of the distributed I/O system in compliance with IEC 61784-1:2002 Ed1 CP 3/1.

**EDD file**

Standardized device descriptions (EDD - Electronic Device Description) permit the integration of intelligent field devices from different manufacturers into different control systems. The IEC 61804-3 standard stipulates the structure of device descriptions. This standard has been developed in cooperation with the following organizations:

- PROFIBUS International (PI)
- HART Communication Foundation (HCF)
- Fieldbus Foundation
- OPC Foundation

The EDDL (Electronic Device Description Language) is used as basis for the device descriptions.

**EFD**

See: Extended fieldbus diagnostics

**EFD system**

If all components involved in the bus link (interface module, field device coupler, active field distributors) support extended fieldbus diagnostics (EFD), this configuration is referred to as an EFD system.

**Equipment, associated**

A piece of electrical equipment that contains both intrinsically safe and non-intrinsically safe power circuits and is configured so that the non-intrinsically safe power circuits cannot impede the intrinsically safe ones.

**Equipment, electrical**

Components, power circuits or parts of power circuits that are normally to be found in their entirety in a single enclosure.

**Equipment, intrinsically safe, electrical**

A piece of electrical equipment in which all power circuits are intrinsically safe.
Extended fieldbus diagnostics

The extended fieldbus diagnostics allows the configuration and comprehensive diagnostics of the complete bus segment:

- Interface module
- Field device coupler
- Active field distributors
- Connecting cables between the devices

Field bus

The field bus is a serial bus system for the distributed integration of field devices in an automation system.

Ground

Ground refers to the entirety of all interconnected inactive parts of equipment that, when correctly installed, cannot conduct dangerous contact voltage even in the event of a malfunction.

GSD file

All slave-specific properties are stored in a Device Data Base File (DDBF file). The format of the DDBF file is to be found in the PROFIBUS guideline: Specification for PROFIBUS Device Description and Device Integration Vol.1: GSD V4.1, 07/2001 of the PROFIBUS-Nutzerorganisation (PNO).

Hazardous area (Ex area)

Area in which a potentially explosive gas atmosphere is present or expected in such quantities that special measures with regard to the design, installation and use of equipment are required.

HW Config

Part of STEP 7 for configuration of hardware.

I&M data (Identification & Maintenance)

Identification data (I data) is information on the module, some of which are printed onto the module enclosure. I data are for reading only.

Maintenance data (M data) is plant-dependent information such as installation location, installation date etc. M data are created during configuration and written onto the module.
I&M data is information stored in a module that supports you when

- Checking the plant configuration
- Locating hardware modifications in a plant
- Correcting errors in a plant

Modules can be uniquely identified online by means of the I&M data.

Master

When a master is in possession of the token, it can send data to other nodes and request data from other nodes (= active node). DP master are, for example, the CPU 315-2 DP or the IM 308-C.

PNO

PROFIBUS user organization

PROFIBUS

PROcess FIeld BUS, process and field bus standard as defined in the field bus standard (IEC 61784-1:2002 Ed1 CPF 3 PROFIBUS and PROFINET). It specifies functional, electrical, and mechanical properties for a bit-serial field bus system.

PROFIBUS is available with the protocols: DP (=distributed I/O) and FMS (= Field bus Message Specification).

PROFIBUS address

For the purpose of unique identification on PROFIBUS*DP, each node must be given a PROFIBUS address.

PC / PD or the ET 200 Handheld have the PROFIBUS address "0".

DP master and DP slaves have a PROFIBUS address from the 1 to 125 range.

PROFIBUS DP

PROFIBUS bus system with the DP protocol. DP stands for the German equivalent of distributed I/O.

PROFIBUS PA

PA stands for Process Automation and increases the range of usage of the PROFIBUS DP family to include the field of process engineering. Process engineering refers to both the intrinsically safe sectors of the chemicals industry and to the non-intrinsically safe sectors, such as nuclear power plant automation, the food industry and waste water technology.
Redundant systems

Redundant systems are characterized by the multiple (redundant) presence of important automation components. If a redundant component fails there the processing of the program is not interrupted.

Segment

A segment or bus segment is a self-contained section of a serial bus system.

Set topology

Topology of the EFD system that was stored retainently in the interface module at the time of commissioning.

The topology of the EFD system essentially comprises the following values:

- Type of redundancy (coupler or ring redundancy)
- Number of couplers
- Number of field distributors
- The spur lines to which field devices are connected
- Actual values determined from the plant at the time of commissioning that are stored retainently in the interface module as setpoints (e.g., voltage and current)

These values are also transferred to the parameter table in SIMATIC PDM at the time of commissioning.

After successful commissioning, the setpoints in the parameter table match those stored in the interface module.

Setpoints from commissioning

See Set topology.

SIMATIC PDM

SIMATIC PDM (Process Device Manager) is a versatile tool for configuring, setting parameters, commissioning, and diagnostics of intelligent process devices from any vendor. SIMATIC PDM provides a uniform user interface for the configuration of a wide range of process devices with a single software package.

Token

In network technology a token refers to a bit pattern that is passed from one bus node to another, enabling that node to access the bus.

Type of protection

The special measures applied to electrical equipment to prevent the ignition of a potentially explosive ambient atmosphere.
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