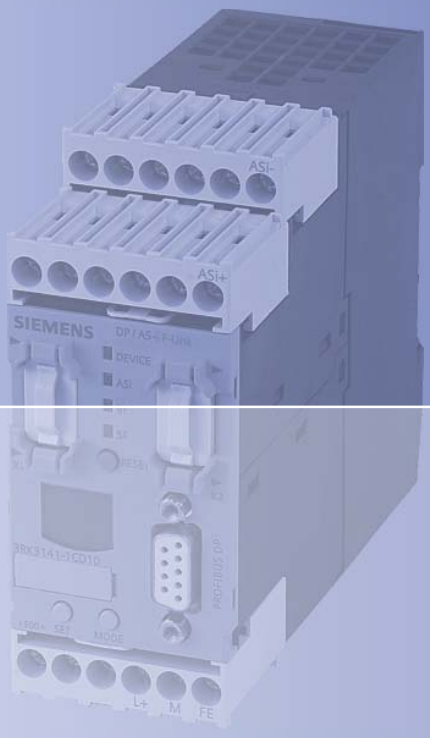
Manual Edition 10/2006



ASIsafe

DP / AS-i F-Link

as-interface

SAFETY INTEGRATED

SIEMENS

SIEMENS

AS-Interface

ASIsafe
DP / AS-i F-Link V1.0

Manual

The following supplements (**Edition 04/2011**) belong to this documentation

1 Preface
1.1 About this documentation (supplements)
1.2 Product-specific safety notes (supplements)
2 Description
2.1 Area of application of the DP / AS-i F-Link (supplements)
2.2 Prerequisites for use (supplements)
4 Data exchange
4.1 Communication principle (supplements)
4.4 Safe Data (PROFIsafe) (supplements)
5 Configuring
5.2 Configuring with OM in STEP 7
6 Commissioning
6.2 Starting up the DP / AS-i F-Link (supplements)
8 Service / diagnostics / remedies
8.1 Diagnostics via indicator LEDs and remedial measures
8.3 Diagnostics via the diagnostic frame and remedial measures
8.4 Using data records for diagnostics information
9 Technical Data
9.6 Safety characteristics (supplements)
9.7 Response times (supplements)

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Safety Guidelines

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

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

Caution

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

Notice

indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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 device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

Warning

This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

All names identified by ® are registered trademarks of the 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.

Siemens AG
Automation and Drives
Postfach 48 48
90437 NÜRNBERG
GERMANY

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Tables

Foreword

1

This chapter provides the following:

- A basic introduction to this documentation:
  - Purpose of this documentation
  - Contents/topics
  - Target groups and required knowledge
  - References to manuals and specialist books
- Product-specific safety information:
  - Notes on safety
  - Liability disclaimer
  - Proper use
  - Safety categories
  - Electromagnetic compatibility (EMC)
  - ESD guidelines
  - Rules for control cabinet installation

1.1 About this documentation

Purpose of this documentation

This manual supports you in using the DP / AS-i F-Link module. You receive a detailed summary of all the information you require to use this module for accessing safe and non-safe AS-i slaves within the scope of a PROFIBUS DP / AS-Interface network.

Contents/topics

This documentation deals with the following DP / AS-i F-Link topics:

- Overview and description
- Installation and connection
- Data exchange and programming
- Configuration and start-up
- Diagnostics, service and maintenance
- Fault analysis and corrective measures

Readerships

This documentation contains information for the following target groups:

- Project planning engineers
- Fitters
- Electrician
- Startup engineer
- Operator
- Service and maintenance personnel

Required Background

Use of this documentation requires the following knowledge and abilities:

- Basic knowledge of safety engineering
- Basic knowledge of control engineering
- Basic knowledge of PROFIBUS DP
- Basic knowledge of AS-Interface

Further documentation

In addition to this documentation, further important information can also be found in the following.

This documentation can be downloaded free from the Internet at:

- http://www.siemens.com/as-interface
- http://www.siemens.com/as-interface/master
- http://www.siemens.com/automation/infocenter
- http://www.siemens.com/automation/service&support

Table 1-1 Further documentation

Identifier	Contents
AS-Interface - Introduction and Fundamentals	Introduction to the AS-Interface system concept and the relevant system components
Technical overview as-interface NEWS	Presentation of new AS-i modules and AS-i masters
System manual Safety Integrated (the safety program for the industries of the world) as well as a supplement to the system manual	Comprehensive fundamental knowledge of industrial safety engineering
S7 Distributed Safety - Configuration and Programming	Comprehensive information on configuring and programming failsafe systems with S7 Distributed Safety
Catalog LV 1	Low-voltage swtichgear SIRIUS, SENTRON und SIVACON, including AS-Interface system

Technical books

If you require any further information, we recommend the following technical books:

Table 1-2 Technical books

Identifier	Order No.	Contents
AS-Interface The Actuator-Sensor-Interface for Automation	ISBN: 3446210652 Order form at: www.as-interface.net	Description of the AS-Interface as a system; background knowledge of aims, properties, handling and possible applications
Automating with SIMATIC	Order No. 6ZB3500-OAE02-OAAO ISBN: 3895782769	Insight into configuring and parameterizing the controller and the distributed I/O; communication via network connections
Decentralization with PROFIBUS DP/DPV1	Order No. 6ZB3500-OAC02-OAAO ISBN: 3895782181	Configuring PROFIBUS DP; data exchange with user programs

References

The appendix to this documentation contains a bibliography.
The bibiliography lists the sources referred to in the text at points marked, for example, /1/.

Definitions

- ASIsafe

  The concept AS-Interface Safety at Work (protected under the name "ASIsafe" at Siemens) enables integration into an AS-Interface network of safety-related components such as:

  – EMERGENCY STOP switch

  – Protection door switches

  – Safety light grids

  These are fully compatible in accordance with EN 50 295 with the familiar AS-Interface components (master, slaves, power section, etc.) and can be operated together on the yellow AS-Interface cable.
  Siemens supplies all the components for setting up a safe AS-Interface network.

- ASIsafe slaves

  Safety-related slaves for the AS-Interface network (F-DI / F-DO).

- Configuring mode (Config mode)

  In "Config" mode, the DP / AS-i F-Link exchanges data with every connected AS-i slave. Newly added AS-i slaves are immediately detected, activated and included in cyclic data exchange by the DP / AS-i F-Link. This mode is the necessary preliminary stage to reaching protected mode.

- Failsafe DP standard slaves

  Failsafe DP standard slaves are standard slaves that are operated on PROFIBUS with the DP protocol. Their behavior must comply with IEC 61784-1:2002 Ed1 CP 3 / 1 and the PROFIsafe bus profile. A GSD file is used to configure fail-safe DP standard slaves.

- Protected mode

  In protected mode, the DP / AS-i F-Link only exchanges data with the configured, safe and non-safe AS-i slaves. "Configured" means the slave addresses and configuration data stored in the DP / AS-i F-Link agree with the values of existing AS-i slaves. The display and the LEDs indicate errors and diagnostics data during operation.

- Safety Mode

  – Mode of F I/O in which safety-related communication is possible via safety frames, e.g. monitoring of code sequences on the AS-i bus and their evaluation and transfer to the F-CPU. To reach safety mode with the DP / AS-i F-Link, it is necessary to teach the code sequences of the connected ASIsafe slaves (happens in protected mode).

  – Operating mode of the safety program (distributed safety). In safety mode of the safety program, all safety mechanisms for fault detection and fault reaction are activated. In safety mode, the safety program cannot be modified during operation. Safety mode can be deactivated by the user (deactivated safety mode).

Correction sheet

The appendix to this documentation contains a correction sheet for evaluation and feedback.

Please use it to record your suggestions for improvements, additions and corrections, and return the sheet to us. This will help us to improve the next edition of the manual.

Thank you

1.2 Product-specific safety information

Important note for maintaining operational safety of your system

Warning

Please take note of our latest information

Systems with safety-related characteristics are subject to special operational safety requirements on the part of the operator. The supplier is also obliged to comply with special product monitoring measures. For this reason, we publish a special newsletter containing information on product developments and features that are (or could be) relevant to operation of safety-related systems. By subscribing to the appropriate newsletter, you will ensure that you are always up-to-date and able to make changes to your system, when necessary. Point your browser to

http://my.ad.siemens.de/myAnD/guiThemes2select.asp?subjectID=2&lang=en

There, you can register for the following newsletters:

- AS-Interface (in the Communication / Networks folder)

To receive this newsletter, select the "Updates" check box.

Notes on safety

Warning

EXPLOSION HAZARD: Europe

When used under Ex protection conditions (Zone 2), the devices of the DP / AS-i F-Link product line must be installed in an enclosure.
In the area applied to by ATEX100a (EN 50021), this enclosure must comply with at least IP54 in accordance with EN 60529.
THE DEVICE MAY ONLY BE CONNECTED TO OR DISCONNECTED FROM THE POWER SUPPLY IF AN EXPLOSION HAZARD CAN BE DISCOUNTED WITH CERTAINTY.

Warning

EXPLOSION HAZARD: North America

- Do not connect or disconnect equipment when a flammable or combustible atmosphere is present.
- Replacement of the device can adversely affect suitability for Class I, Division 2 or Zone 2.
- This device is suitable for use in non-hazardous environments or environments that correspond to Class I, Division 2, Group A, B, C, D; Class I, Zone 2, Group IIC.

Caution

Installing devices in control cabinets

Taking the ambient conditions into account, you must install the devices in control cabinets with the IP32, IP43 or IP54 degree of protection.

Note

Category 4 in accordance with DIN EN 954-1 / SIL 3 in accordance with IEC 61508

The system has been tested and approved by TÜV (German Technical Inspectorate). The transmission procedure for safety-related signals has been designed so that applications up to Category 4 can be implemented acc. to EN 954-1, or SIL 3 acc. to IEC 61508.

Caution

Observe the ESD guidelines

Observe the ESD guidelines when handling and installing the DP / AS-i F-Link.
Connection of the DP / AS-i F-Link is only permissible when the power sections (PELV power section and AS-i power section) are switched off.

Caution

Noise immunity/grounding

The following must be grounded in accordance with the regulations in order to ensure noise immunity of the DP / AS-i F-Link:

- DP/AS-i F-Link
- PELV power section
- AS-i power section

Please ensure here that the AS-i cable itself is **not**grounded
(symmetry + 15 V / - 15 V)!

Notice

Breaks in communication

If the EMC Directive 89 / 336 / EEC (CE) is not complied with when installing systems and devices, this can result in breaks in the communication link between the PROFIBUS DP master and the DP / AS-i F-Link.

Liability disclaimer

Warning

Liability disclaimer for systems not designed by Siemens

The products described here were developed to perform safety-oriented functions as part of an overall installation or machine. A complete safety-oriented system generally features sensors, evaluation units, signaling units, and reliable shutdown concepts. It is the responsibility of the manufacturer to ensure that a system or machine is functioning properly as a whole. Siemens AG, its regional offices, and associated companies (hereinafter referred to as "Siemens") cannot guarantee all the properties of an entire plant, system or machine that has not been designed by Siemens.

Nor can Siemens assume liability for recommendations that appear or are implied in the following description. No new guarantee, warranty, or liability claims beyond the scope of the Siemens general terms of supply are to be derived or inferred from the following description.

Proper use

Warning

Proper use of the DP / AS-i F-Link

The device may be used only for the applications described in the catalog and in the technical description, and only in combination with the equipment, components and devices of other manufacturers where recommended or permitted by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Before you run any sample programs or programs you have written yourself, make sure that running the plant cannot cause injury to anyone else or damage to the machine itself.

EU note: Start-up/commissioning is absolutely prohibited until it has been ensured that the machine in which the component described here is to be installed fulfills the regulations/specifications of Machinery Directive 89/392/EEC.

1.3 Standards and certifications

Product Name:

Table 1-3 Product Name:

Product Name:	MLFB
DP / AS-i F-Link with screw-type terminals	3RK3141-1CD10
DP / AS-i F-Link with spring-loaded terminals	3RK3141-2CD10

Test certificates

The following test certificates are available for the above product:

- PROFIBUS
- AS-Interface
- TÜV (special test certificate)

EC EMC Guideline 89/336/EEC

CE

The above product fulfills the requirements of the EU Directive 89/336/EEC ”Electromagnetic compatibility”.

The EC declaration of conformity is kept available for the competent authorities in accordance with the above-named EC directives at:

Siemens Aktiengesellschaft
Automation and Drives Group
Test lab, Approvals, Standardization and Associative Work
A&D CD CC TS
D-92220 Amberg, Germany

Area of application

The product meets the following requirements:

Table 1-4 Area of application

Area of application	Requirements	
	Interference emission	Noise immunity
Industry	EN 61000-6-4: 2001	EN 61000-6-2: 1999

Observance of installation guidelines

The product meets the requirements if you observe the assembly guidelines described in this documentation when installing and operating.

Notes for machine manufacturers

This product is not a machine in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 98/37/EEC for this product.

If the product is part of the equipment of a machine, the manufacturer of the machine must included it in the procedure for obtaining the declaration of conformity.

Description

2

This chapter provides information on the following:

- Application areas
- Performance features
- Components of the product
- Prerequisites for use
- Coding
- Detailed descriptions

2.1 Area of application of the DP / AS-i F-Link

Link between PROFIsafe and ASIsafe

The DP / AS-i F-Link is PROFIBUS DP slave and AS-i master simultaneously and can forward safety-related input data from ASIsafe slaves via the PROFIsafe protocol to a failsafe CPU with PROFIBUS DP master. The DP / AS-i F-Link can also be operated behind a PROFInet / PROFIBUS gateway. Additional safety-related cabling or monitoring is not required.
With the help of the DP / AS-i F-Link, you can access the inputs and outputs of the AS-i slaves via PROFIBUS DP. Depending on the slave type, transmission of binary values or analog values is possible. You can operate all slaves that comply with the AS-Interface specification V3.0 as AS-i slaves.

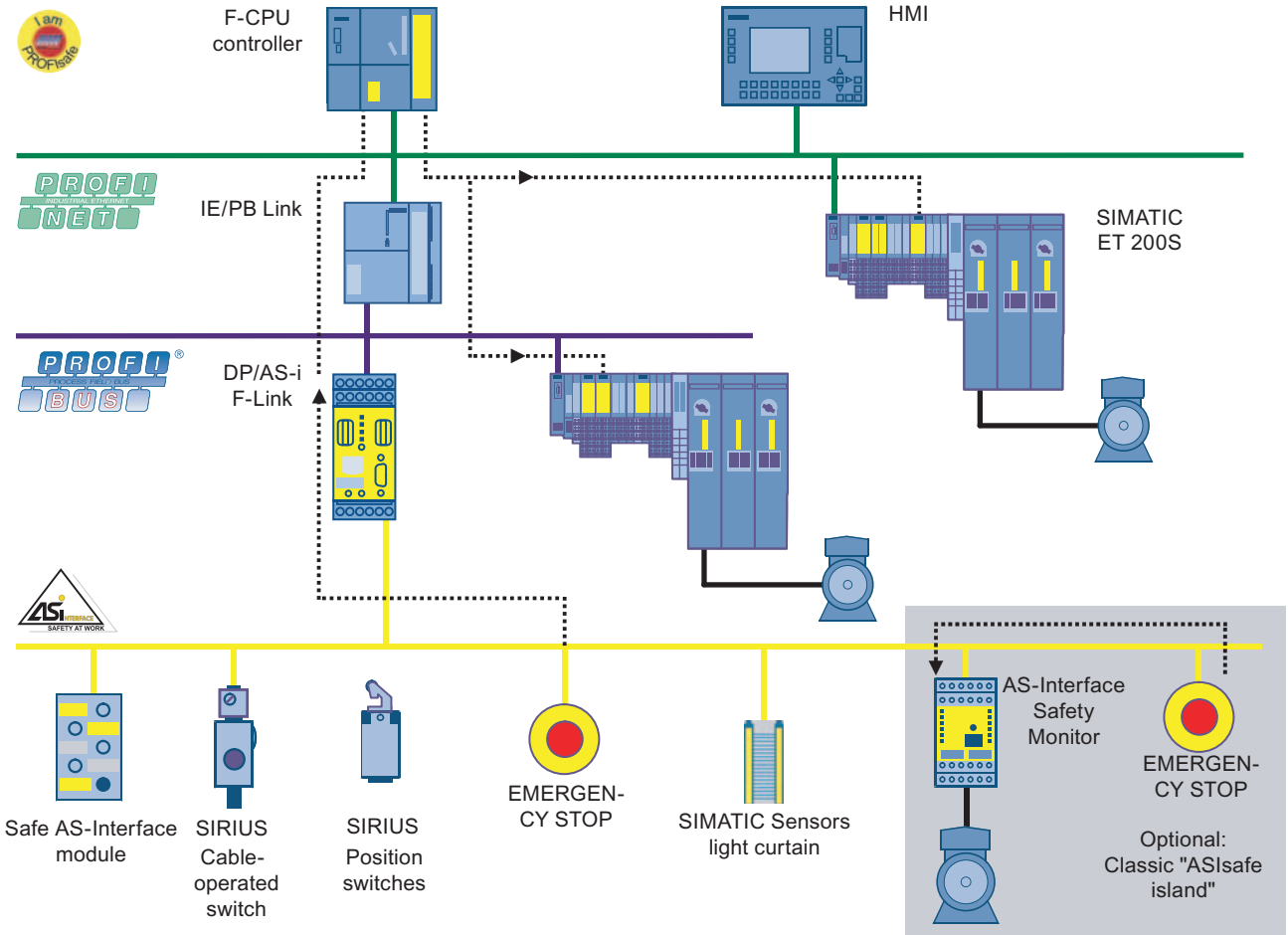


Figure 2-1 Example of a system configuration with DP / AS-i F-Link

Performance features

The DP / AS-i F-Link is PROFIBUS DP-V1 slave (in accordance with EN 50170) and AS-i master (in accordance with AS-Interface specification V3.0 to EN 50295) and enables transparent data access to AS-Interface from PROFIBUS DP.
PROFIBUS DP masters in accordance with DP-V0 or DP-V1 can exchange I/O data

cyclically with lower-level AS-i slaves, and PROFIBUS DP master with acyclic services in accordance with DP-V1 can additionally execute AS-i master calls (parameters, diagnostics). As well as the digital I/O data, analog data are also stored with high performance in the I/O area of a failsafe S7-300 / 416 F-CPU (when configuring with Object Manager in STEP 7), (no separate call of communication blocks necessary).

In configuring mode, the DP / AS-i F-Link reads configuration data of the I/O into the AS-Interface. You can set addresses and transfer code sequences of safe AS-i slaves.

During operation, LEDs and the display provide detailed diagnostics information that immediately pinpoints faults when necessary. Via a user program, you can read out diagnostics data records and make them available to a higher-level human machine interface system (e.g. WinCC).

The most important features are:

- Monitoring of the inputs of safety-related binary AS-i slaves and data forwarding via PROFIsafe. No need for additional safety-related components for the AS-Interface (e.g. additional cabling, safety monitor)
- AS-i master (in accordance with AS-Interface specification V3.0 master profile M4) for connecting up to 62 AS-i slaves and integral analog value transmission
- Connection behind a PROFInet / PROFIBUS gateway possible
- Failsafe DP standard slave (when configuring with GSD file)
- As the AS-i master, the DP / AS-i F-Link can work together with an AS-Interface safety monitor independently of the PROFIBUS configuration
- Local diagnostics via LEDs and display with operator input keys
- Optimal TIA integration into STEP 7 via Object Manager, integration into engineering tools of other vendors through PROFIBUS type file (GSD)
- Module replacement without PG since the startup data are transferred via the PROFIBUS DP master
- Internal, non-volatile memory for PROFIBUS and PROFIsafe address, I&M-data and device-specific parameters

Note

I&M (identification & maintenance) data

The I&M data can be viewed or edited, for example, in STEP 7, HW Config by selecting "Load Module Identification ..." in the "PLC" menu.

Components of the product

The following components are included in the scope of supply of the DP / AS-i F-Link in the version with screw-type terminals (MLFB: 3RK3141-1CD10) or spring-loaded terminals (MLFB: 3RK3141-2CD10):

- Product "DP / AS-i F-Link"
- Operating instructions "DP / AS-i F-Link"

2.2 Prerequisites for use

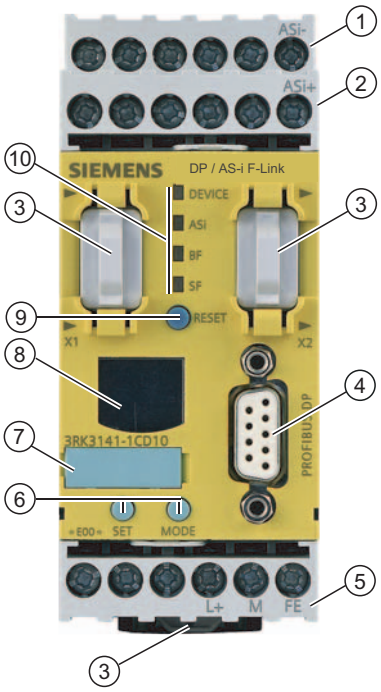
The following requirements must be met before you use the DP / AS-i F-Link:

- A failsafe CPU with PROFIBUS DP master is available (however, a standard PROFIBUS DP master can be used for non-safe communication with non-safe AS-i slaves)
- A PROFIBUS DP network is available
- An AS-i network with separate AS-i power supply (e.g. MLFB: 3RK9 502-0BA0) is available
- AS-i slaves or ASIsafe slaves are available
- A PELV power section with 24 V DC for the DP / AS-i F-Link is available
  Use is possible if the available 24 V power section in the control cabinet corresponds to the technical requirements
- For configuring with STEP 7 and Object Manager
  - STEP 7 fromVersion 5.4 with Service Pack 1 is installed on a PC / PG
  - The option package S7 Distributed Safety from Version 5.4 with Service Pack 1 is installed (for S7-300 / 416 F-CPU)
  - The S7 F Configuration-Pack from Version 5.5 is installed (e.g. for SINUMERIK 840D)
  - The PC / PG is connected with the failsafe CPU via the PROFIBUS DP master
- For configuring by means of the GSD file
  - PLC-specific configuring tool (e.g. STEP 7) is installed on a PC/PG.
    For configuring with STEP 7, you additionally require the S7 F Configuration-Pack or the option package S7 Distributed Safety as described above
  - The PC / PG is connected with the failsafe CPU via the PROFIBUS DP master

2.3 Coding

The front view of the DP / AS-i F-Link shows the connections, indicators and operator-input keys that are important for operation.

Table 2-1 Front view of the DP / AS-i F-Link

Picture	No.	Description
	1	Removable terminal block D: ASi-: Connection for the blue core of the AS-i cable
	2	Removable terminal block C: ASi+: Connection for the brown core of the AS-i cable
	3	Interface covers
	4	PROFIBUS DP connection
	5	Removable terminal block A: L+: 24 V DC M: Chassis ground 24 V DC FE: Function ground/earth
	6	SET key: Confirm MODE key: Select
	7	Inscription labels
	8	Display: Two-line, red backlighting
	9	RESET key: Factory settings
	10	DEVICE LED: Device status ASi-LED: AS-i voltage/status BF-LED: Bus fault (PROFIBUS DP) SF-LED: Group errors

Notice

Impairing electromagnetic compatibility

The interface covers protect the service interfaces against contamination or electrostatic discharge.
Unused interfaces must remain closed.

2.4 Displays and operator controls

2.4.1 Display LEDs

The LEDs on the front side of the DP / AS-i F-Link show the current status as well as error messages.

Note

Meaning of the LEDs

For the meanings of the LEDs, please refer to the section "Overview of the LEDs" in the chapter "Service/diagnostics/remedies"

See also

Overview of indicator LEDs (Page 8-2)

2.4.2 Keys

The keys on the front side of the DP / AS-i F-Link have the following general meanings:

- "MODE":
  - Scrolling down of messages and menu entries by simple pressing
  - Jump back up one entry by double-clicking
  - Increase of the switching speed by pressing and holding (> 1 s)
- "SET":
  - Confirmation of a menu entry or opening of an appropriate further choice
  - Changing from status mode to menu mode
- "MODE" + "SET"
  Jump to the menu entry "EXIT" by holding down both keys in menu mode.
- "RESET":
  Restoration of factory settings according to the prescribed scheme
  Please refer to the section "Restoring factory settings" in the chapter "Configuring"

2.4.3 Display

Operating status of the display

The display has two operating states:

- Status mode (normal operation) with error and status messages of the DP / AS-i F-Link and the connected buses
- Menu mode with the display menu
  In this mode, you can scan and modify the settings and call selected error messages

Display indicators

The two-line display can indicate the following:

- The first line contains the menu heading or an information text.
- The second line can contain a menu entry or further information about the type of error.
- A continuous underscore indicates that further information is available and can be selected with the "MODE" key.
- If a continuous underscore appears in both lines of the "LIST" sub-menu, the current representation is fixed. Pressing "MODE" interrupts the fixing.

Note

Messages in status mode

For the error messages in status mode, please note the section "Error and status messages of the display in status mode" in the chapter "Service/diagnostics/remedies".

Navigation in the display menu in menu mode

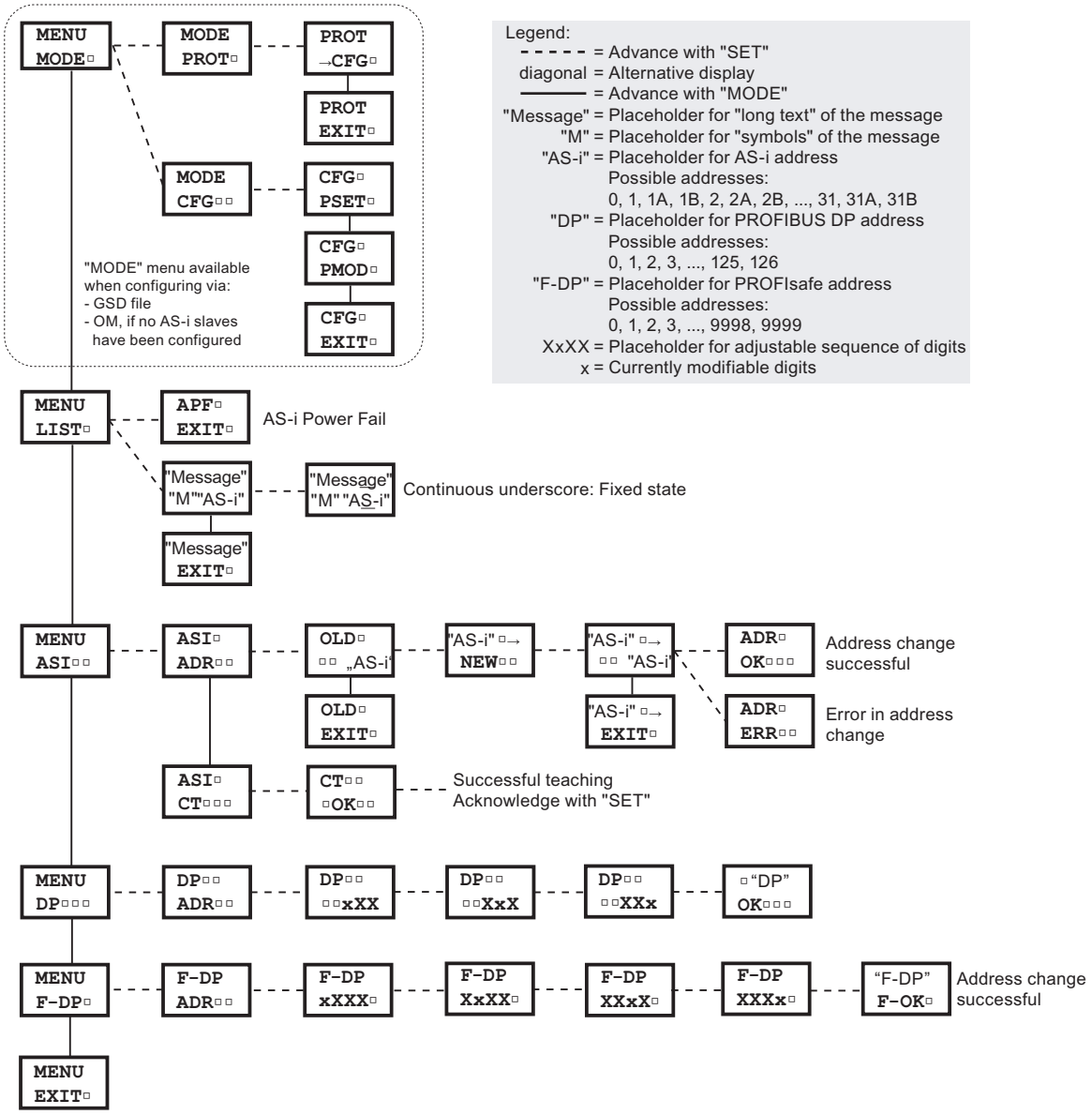


Figure 2-2 Navigation in menu mode

Note

Meaning of the menu entries

- The menu entries "MODE", "ASI", "DP", "F-DP" and "EXIT" are explained in the section "Settings and operator inputs on the device" in the chapter "Configuring".
- The menu entry "LIST" is explained in the section "Listing faults via the display menu in menu mode" in the chapter "Service/diagnostics/remedies".

See also

Fault and status messages of the display in status mode (Page 8-5)
Settings and operator inputs using the display menu (Page 5-46)
Listing faults via the display menu in menu mode (Page 8-9)

Installing/connecting

3

This chapter provides information on the following:

- Installation of the DP / AS-i F-Link
  - On mounting rail to DIN EN 60715 (snap-on mounting without tool)
  - On level surface (screw-type mounting)
- Connection assignments
- Connecting the DP / AS-i F-Link
  - With removable screw-type terminal blocks (MLFB: 3RK3141-1CD10) (screw-type connections)
  - With removable spring-loaded terminal blocks (MLFB: 3RK3141-2CD10) (spring-loaded connections)
- The connection to PROFIBUS DP
- Deinstallation of the DP / AS-i F-Link

3.1 Installation instructions

Warning

Malfunction due to contamination

Cover the DP / AS-i F-Link when drilling work is carried out above it. No particles must enter the ventilation openings in the housing, especially metal shavings.

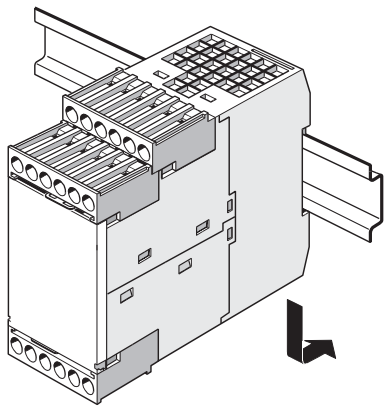
3.2 Mounting the device on a DIN rail

Requirements

- At the installation location, a horizontal 35-mm mounting rail in accordance with DIN EN 60715 is properly secured
- Please note the minimum gaps and the installation position specified in the section "Mechanical data" in the chapter "Technical data"

Procedure

Table 3-1 Installation on a DIN rail

Step	Operating instruction	Picture
1	Hang the back of the device onto the upper edge of the DIN rail	
2	Press the lower half of the device against the DIN rail until the device engages	

See also

Mechanical data (Page 9-2)

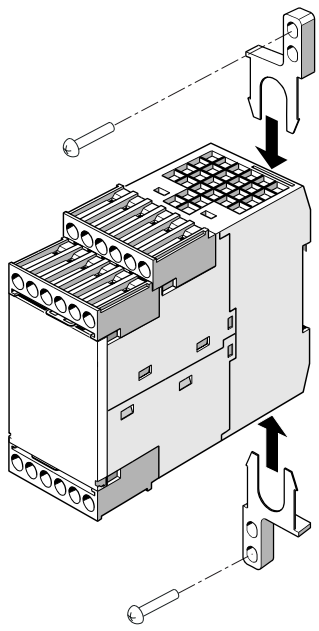
3.3 Mounting the device on a level surface

Requirements

- Two plastic securing lugs
  Please refer to the accessories list in the appendix for the relevant order number
- Two correctly drilled holes, threaded or with plug on the level surface
  Refer to the relevant drilling template in the appendix for the distances between the drill holes
- Two screws with a maximum thread diameter of 4.8 mm
- Please note the minimum gaps and the installation position specified in the section "Mechanical data" in the chapter "Technical data"

Procedure

Table 3-2 Mounting on a level surface

Step	Operating instruction	Picture
1	Insert the securing brackets into the openings provided on the device until they engage	
2	Hold the device up to the surface prepared for screw-mounting	
3	Insert the screws through the oblong holes in the securing brackets	
4	Screw the device onto the level surface	

See also

Mechanical data (Page 9-2)

3.4 Connecting the device via terminal blocks

Caution

Switching off the supply voltage

Before starting work, disconnect the device from the supply.

Notice

Cable cross sections and tightening torques

Please note the maximum cable cross-sections and tightening torques in the section "Connection data for terminal blocks" in the chapter "Technical data".

Note

Functional ground - PE

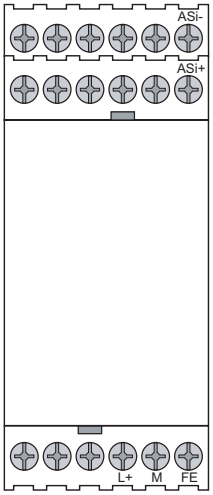
Functional ground FE must be connected with the protective ground conductor PE with as low an impedance as possible.

Requirements

- The insulation on the connecting cables from the PELV power section and the AS-i cables is properly stripped to a length of 10 mm.
- Flexible cables with end sleeves or cable lugs.

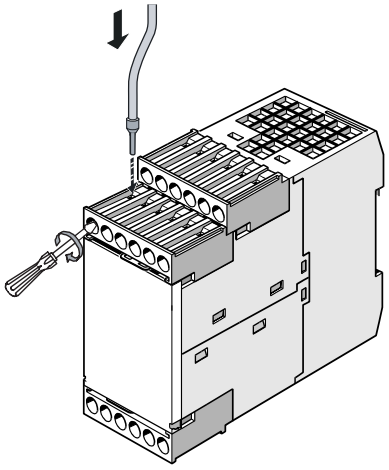
Assignment of the terminal blocks

Table 3-3 Assignment of the terminal blocks

Picture	Identifier	Description
	ASi-	AS-i terminal for blue core of the AS-i cable
	ASi+	AS-i terminal for brown core of the AS-i cable
	L+	24 V DC
	M	Ground to 24 V DC
	FE:	Function ground/earth

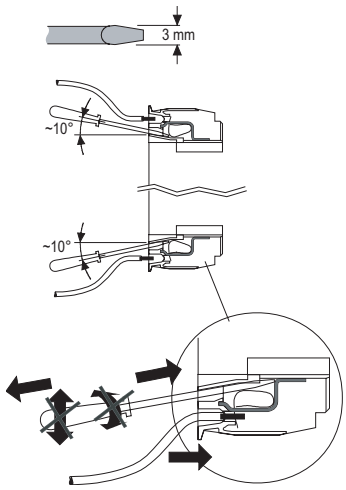
Procedure with screw-type terminal blocks (MLFB: 3RK3141-1CD10)

Table 3-4 Screw-type connections

Step	Operating instruction	Picture
1	Insert the relevant cable into square on the screw-type terminal until it engages.	
2	Hold the cable in the screw-type terminal	
3	Tighten the screw of the terminal in which the cable in inserted	
4	Pull on the cable to ensure it is screwed tight	

Procedure with spring-loaded terminal blocks (MLFB: 3RK3141-2CD10)

Table 3-5 Spring-loaded connections

Step	Operating instruction	Picture
1	To release the terminal spring, insert the 3-mm flat-head screwdriver into the square opening of the spring-loaded terminal until it engages. Please observe a 10° horizontal angular deviation of the screwdriver to the oval opening	
2	Insert the cable into the oval opening until it engages.	
3	Hold the cable in the spring-loaded terminal	
4	Remove the screwdriver	
5	Pull on the cable to ensure it is tight	

See also

Connection data for terminal blocks (Page 9-5)

3.5 Establishing a PROFIBUS DP connection

Warning

Impairment to plant function from incorrect connection to PROFIBUS DP

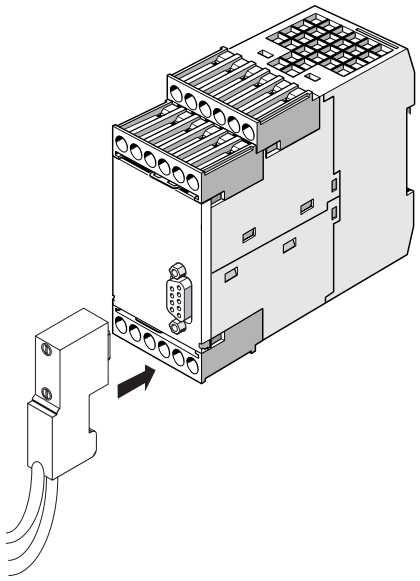
Please note the information in the PROFIBUS standard DIN EN 61158 when laying and installing the PROFIBUS DP cable and the bus connector.

Requirements

PROFIBUS DP connection cable with 9-pin sub-D connector is available.

Procedure

Table 3-6 Connection to PROFIBUS DP

Step	Operating instruction	Picture
1	Connect the PROFIBUS DP connector to the PROFIBUS DP interface	
2	Tighten the screws on the PROFIBUS DP connector.	
3	If the device is located at the end of the PROFIBUS DP cable, switch on the terminating resistor on the PROFIBUS DP connector.	

3.6 Disconnecting and uninstalling the device

Caution

Switching off the supply voltage

Before starting work, disconnect the device from the supply.

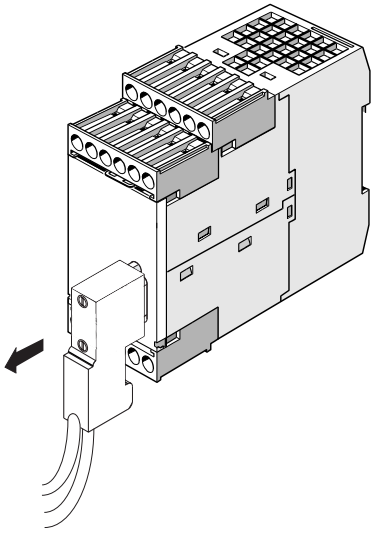
Note

Replacing the device

If you want to replace the device, please note the instruction "Replacing the DP / AS-i F-Link" in the section "Hardware replacement" of the chapter "Service/diagnostics/remedies".

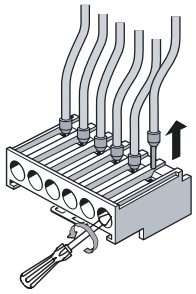
Disconnecting a PROFIBUS DP connection

Table 3-7 Disconnecting the PROFIBUS DP connection

Step	Operating instruction	Picture
1	Loosen the screws of the PROFIBUS DP connector	
2	Unscrew the screws on the PROFIBUS DP connector.	

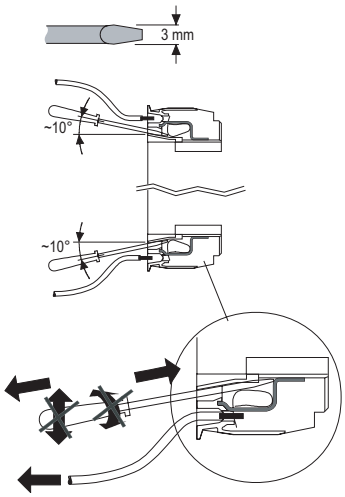
Disconnecting screw-type terminal blocks (MLFB: 3RK3141-1CD10)

Table 3-8 Disconnecting screw-type terminals

Step	Operating instruction	Picture
1	Unscrew the screw of the screw-type terminal	
2	Remove the cable from the unscrewed terminal	

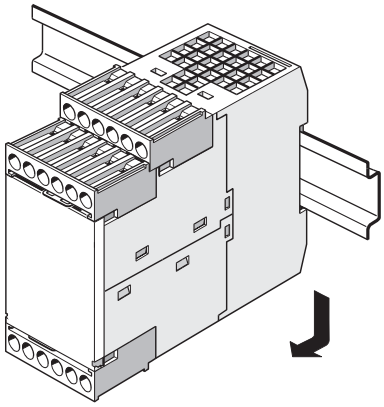
Disconnecting spring-loaded terminal blocks (MLFB: 3RK3141-2CD10)

Table 3-9 Disconnecting spring-loaded terminals

Step	Operating instruction	Picture
1	Insert the screwdriver into the opening of the spring-loaded terminal until it engages. Please note a 10° horizontal angular deviation of the screwdriver to the oval opening	
2	Remove the cable from the oval opening	
3	Remove the screwdriver	

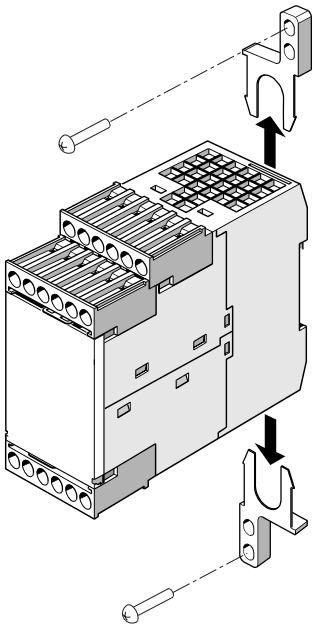
Uninstalling the device from a DIN rail

Table 3-10 Uninstalling from DIN rails

Step	Operating instruction	Picture
1	Pull the device down until the lower half can be pulled away from the DIN rail	
2	Pull the lower half of the device away from the DIN rail	
3	Lift the device from the upper edge of the DIN rail	

Uninstalling the device from a level surface

Table 3-11 Uninstalling from a level surface

Step	Operating instruction	Picture
1	Hold the device firmly	
2	Unscrew the cap screws.	
3	Lift the device from the level surface	
4	Remove the securing brackets from the device	

See also

Replacing the DP / AS-i F-Link (Page 8-17)

Data exchange

4

This chapter tells you how to access AS-i slaves from the PROFIBUS DP-master via the DP / AS-i F-Link.

This deals with data transmission via

- Cyclic PROFIBUS DP services:
  - Binary data
  - Safe data
  - Analog data
- Acyclic PROFIBUS DP services:
  - Analog data

4.1 Communications principle

The PROFIBUS DP-master communicates with the AS-i slaves via the DP / AS-i F-Link .

The AS-i communication objects are mapped onto a contiguous data area for input and output data in the PROFIBUS DP-master.

interfaces

The DP / AS-i F-Link manages two interfaces:

- Interface to the PROFIBUS-DP-master: PROFIBUS DP
- Interface to the AS-i slaves: AS-Interface

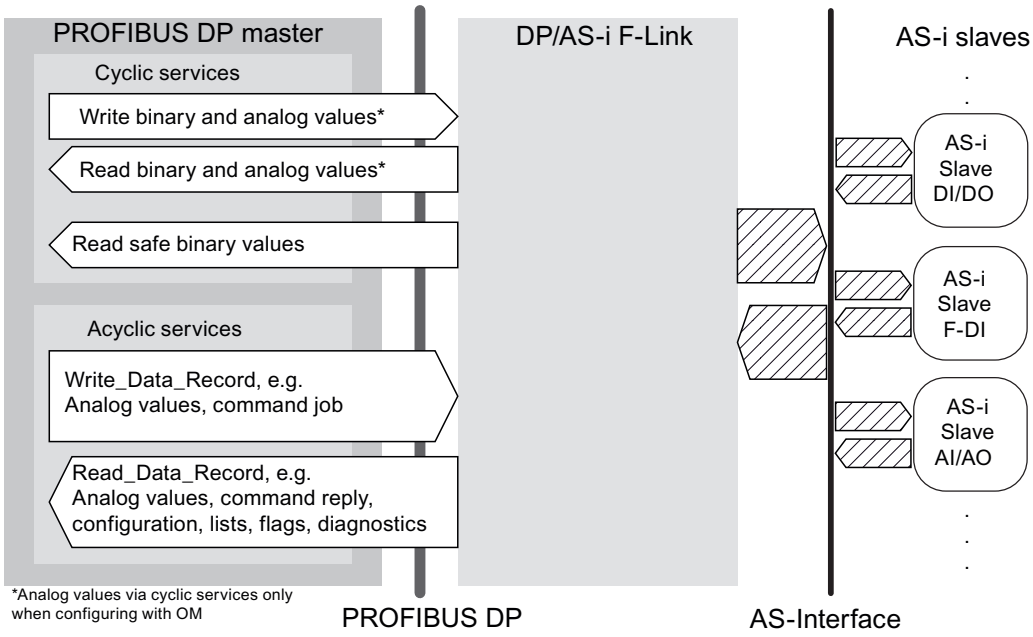


Figure 4-1 Communications principle for data exchange between PROFIBUS DP-master and AS-i slaves

4.2 Overview of data exchange

Representation of the process data in the memory area of the PROFIBUS DP-master depends on the method of configuring and the data type.

Table 4-1 Process data length

Data type/direction of exchange	OM configuring	GSD configuring
Binary DI / DO (Chapter 4.3)	Variable (maximum 32 bytes) (Chapter 5.2.5.2)	Fixed (16 / 32 bytes) (Chapter 5.3.3.1)
Binary safe F DI (Chapter 4.4)	Fixed (12 bytes, of which 4 bytes accessible to user) (Chapter 5.2.4.4 and 5.2.7.5)	Fixed (12 bytes, of which 4 bytes accessible to user) (Chapter 5.3.4.1 and 5.3.4.2)
Analog AI / AO (Chapter 4.5.1)	Fixed (2 bytes) The number of analog values that can be transferred via the PA is variable (Chapter 5.2.7.2)	- (only via data records) (Chapter 4.5.2)

The methods of arranging the I/O addresses for the binary data in the PIO and the PII also depend on the configuring method.

Table 4-2 Address sorting of the binary process data

Sorting	OM configuring	GSD configuring
LINEAR	X	-
CLASSIC	X	X
Packed	X	-

The structure of the sorting is described in Chapter 5.2.5.2.

4.3 Binary data

In **cyclic** mode, the PROFIBUS DP-master accesses the binary inputs and outputs of the AS-i slaves via the DP / AS-i F-Link. The input and output data of the AS-i slaves are mapped onto a contiguous data area in the PROFIBUS DP-master.

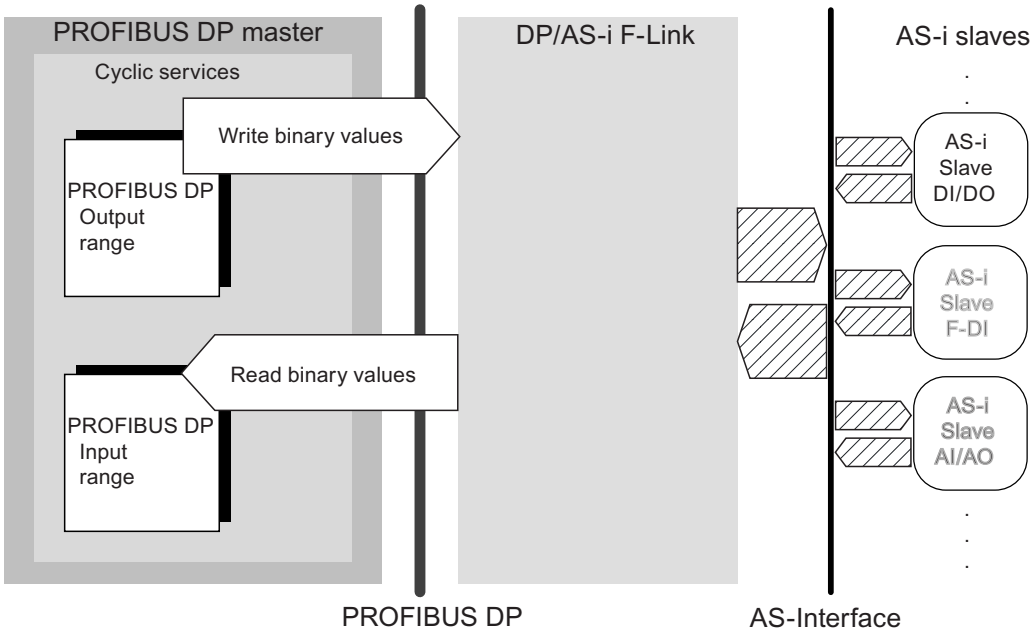


Figure 4-2 Communications principle of AS-i binary value transfer

From the viewpoint of the PROFIBUS DP-master, the DP / AS-i F-Link occupies up to:

- 32 input bytes and 32 output bytes for binary data when assigned up to 62 A / B slaves
- 16 input bytes and 16 output bytes for binary data when assigned up to 31 standard AS-i slaves

The start addresses of the input or output data depend on the configuring of the PROFIBUS DP-master. Also dependent on this is the arrangement of I/O bits with regard to the AS-i addresses.

Note

Arrangement of the binary data in the memory area of the CPU

Please note in this regard the description of the "Digital Addresses" tab in the "Properties DP/AS-i -..." in the chapter "Configuring with OM in STEP 7"

See also

"Digital Addresses" tab in the "Properties - DP/AS-i -..." dialog box (Page 5-12)

4.3.1 Representation of the ASIsafe slaves in the non-safe process image

Please see the table below for the meaning of the data bits of the ASIsafe slaves.

Table 4-3 Arrangement of the bits with status information of the ASIsafe slaves in the PII

PII bit	Identifier	Value	Meaning
D.0	F-IN 1	0	Contact 1 (Pin 1 - Pin 2) open
		1	Contact 1 (Pin 1 - Pin 2) closed
D.1	Status ASIsafe slave	0	ASIsafe slave not activated
		1	ASIsafe slave activated
D.2	F-IN 2	0	Contact 2 (Pin 3 - Pin 4) open
		1	Contact 2 (Pin 3 - Pin 4) closed
D.3	I/O error bit	0	No I/O error
		1	I/O error pending

4.4 Safe data (PROFIsafe)

The DP / AS-i F-Link evaluates the input data of the ASIsafe slaves and transfers the switching state to the PROFIBUS DP master via PROFIsafe.

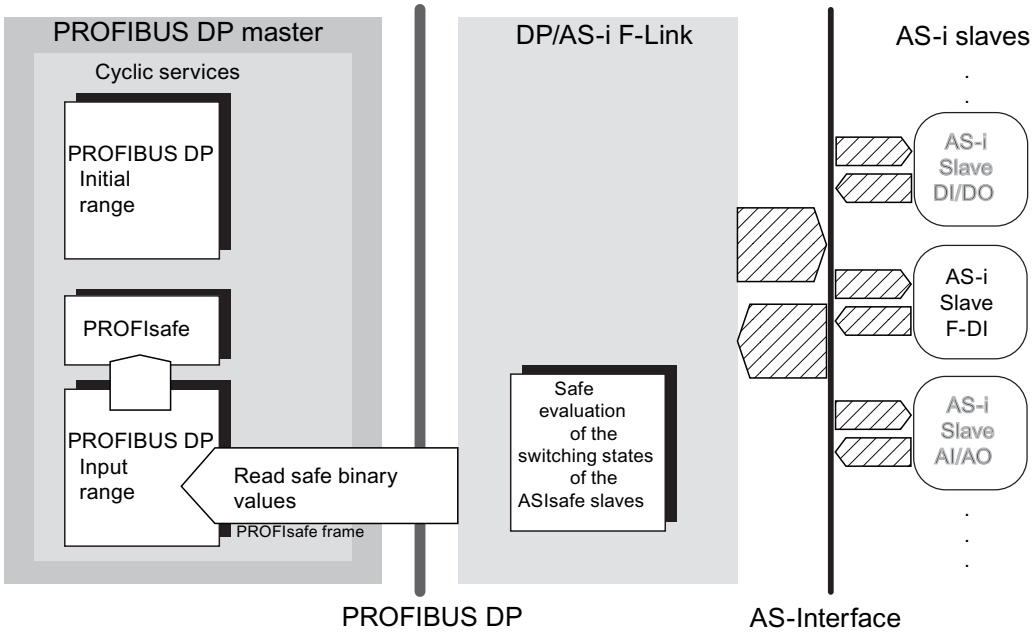


Figure 4-3 Communications principle of transferring safe binary data

Process image of the safe input data

The PROFIsafe message frame occupies the following lengths in the PROFIBUS DP address space:

- PIO 4 bytes (only PROFIsafe administration information)
- PII 12 bytes. The PII also contains safe binary input data of the ASIsafe slaves (F-DI)

Table 4-4 Process image of the safe input data

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	F-DI Slave 7	F-DI Slave 6	F-DI Slave 5	F-DI Slave 4	F-DI Slave 3	F-DI Slave 2	F-DI Slave 1	Reserved
1	F-DI Slave 15	F-DI Slave 14	F-DI Slave 13	F-DI Slave 12	F-DI Slave 11	F-DI Slave 10	F-DI Slave 9	F-DI Slave 8
2	F-DI Slave 23	F-DI Slave 22	F-DI Slave 21	F-DI Slave 20	F-DI Slave 19	F-DI Slave 18	F-DI Slave 17	F-DI Slave 16
3	F-DI Slave 31	F-DI Slave 30	F-DI Slave 29	F-DI Slave 28	F-DI Slave 27	F-DI Slave 26	F-DI Slave 25	F-DI Slave 24
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							
8	PROFIsafe administration information							
9								
10								
11								

4.5 Analog data

In cyclic mode (only with OM configuring), the PROFIBUS DP master can access the analog values of the analog AS-i slaves direct in the cyclic process image. The input and output data of the AS-i slaves are mapped onto a contiguous data area in the PROFIBUS DP master.
Acyclic access to analog data via data records 140 to 147 is possible with GSD and OM configuring.
With simultaneous read access, the cyclic process image has priority over the data records. Simultaneous write access to analog data of an AS-i slave is not permissible either via cyclic or acyclic services.

Notice

Restriction for AS-i slaves in accordance with Profile 7.1 and 7.2

The following versions apply only for AS-i slaves that handle analog value transfer in accordance with AS-i Slave profile 7.3, 7.4, 7.5.5, 7.A.5, B.A.5, 7.A.A, 7.A.8, 7.A.9 or 6.0 (Combined Transaction Types CTT 1 to 5 in accordance with AS-i Specification V3.0). Analog value transfer in accordance with AS-i Slave Profile 7.1 / 7.2 is not supported by the DP / AS-i F-Link. In this case, analog data transfer must be handled by means of a user program.

Analog interface between PROFIBUS DP master and DP / AS-i F-Link

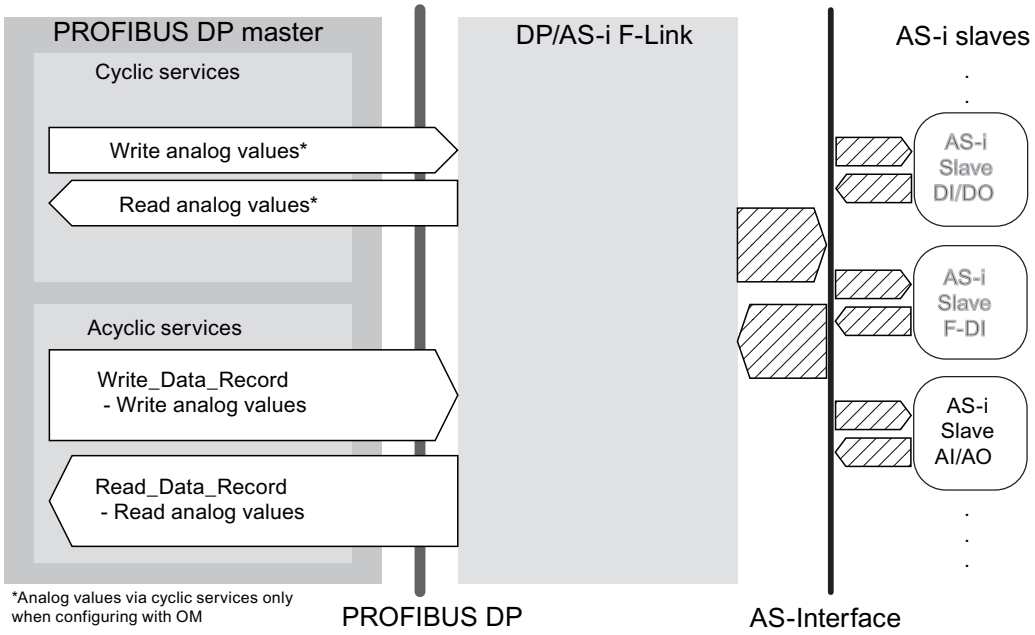


Figure 4-4 Communications principle of AS-i analog value transfer

4.5.1 Analog data via cyclic PROFIBUS DP services

In OM configuring, analog slaves can be assigned to up to 31 AS-i addresses. Up to 8 bytes of data are available for each address. You can configure up to 4 analog channels per AS-i address, that all originate from one analog AS-i slave. A total of up to 240 bytes are available for the process data.

Note

Transfer of analog data via cyclic PROFIBUS DP services

Please note in this regard the description of the "Configuration" tab in the "Properties AS-i Slave -..." dialog box in the chapter "Configuring with OM in STEP 7"

See also

"Configuration" tab in the "Properties AS-i Slave -..." dialog box (Page 5-26)

4.5.2 Analog data via acyclic PROFIBUS DP services

4.5.2.1 Calling the acyclic PROFIBUS DP services/data records

The acyclic services in accordance with PROFIBUS standard DP-V1 allow you to carry out special jobs (data records) for sending output data to PROFIBUS DP slaves or for receiving input data from PROFIBUS DP slaves as an alternative to cyclic data transfer.
Data records 140 to 147 are available for analog value transfer.

Notice

Errors in the case of simultaneous cyclic and acyclic analog data access

Simultaneous write access to analog data of a slave is not permissible either via cyclic or acyclic services.

Note

Saving I/O address space

By accessing analog data via acyclic services, you can save I/O address space in the PROFIBUS DP master.

Job parameters for analog value access

Parameterize the jobs Read_Data_Record and Write_Data_Record as described in the "Data records" appendix.
Access to analog values is controlled via the following parameters:

- Index:
  Determines the data record number where the analog values are stored in the DP / AS-i F-Link. You can learn below how the available data record numbers 140 to 147 are used
- Length:
  Determines the length of the I/O data area; the length specification must agree with the data record used and with the address area of the analog slave. There are more explanations and examples below
- Data:
  Determines the address of the I/O data area in which your user program accesses the analog values or makes the analog values available

Data consistency

The analog value transferred from or to the PROFIBUS DP master is always consistent with regard to an AS-i slave The information is transferred sequentially on the channels.

Representation of the analog values in the data records

For analog value access, select one of the data records between 140 and 147. The data records differ in length. If you operate fewer analog AS-i slaves than are supported by the DP / AS-i F-Link, optimize the reserved data area of you user program with an appropriate selection.

Each slave address requires an area of 8 bytes to administer 4 analog channels.

Notice

Slave address 31 in data record 140

Please note that slave address 31 in data record 140 is not used!

Information for using the tables below

- The table "Access to analog values via data records" specifies the bytes of a data record to which an AS-i slave transfers its analog values.
- The table "Address area for the analog values of an AS-i slave" shows how the analog values of an AS-i slave are represented within a byte.
- You can find more read information after the tables.

Access to analog values

The table can be used for the analog**input**area and for the analog**output**area.

Table 4-5 Access to analog values via data records

-	Start address for analog values in the data record							
Address of AS-i slave	DR 140 240 bytes (max.)	DR 141 216 bytes (max.)	DR 142 184 bytes (max.)	DR 143 152 bytes (max.)	DR 144 120 bytes (max.)	DR 145 88 bytes (max.)	DR 146 56 bytes (max.)	DR 147 24 bytes (max.)
1	0	-	-	-	-	-	-	-
2	8							
3	16							
4	24							
5	32	0						
6	40	8						
7	48	16						
8	56	24						
9	64	32	0					
10	72	40	8					
11	80	48	16					
12	88	56	24					
13	96	64	32	0				
14	104	72	40	8				
15	112	80	48	16				
16	120	88	56	24				
17	128	96	64	32	0			
18	136	104	72	40	8			
19	144	112	80	48	16			
20	152	120	88	56	24			
21	160	128	96	64	32	0		
22	168	136	104	72	40	8		
23	176	144	112	80	48	16		
24	184	152	120	88	56	24		
25	192	160	128	96	64	32	0	
26	200	168	136	104	72	40	8	
27	208	176	144	112	80	48	16	
28	216	184	152	120	88	56	24	
29	224	192	160	128	96	64	32	0
30	232	200	168	136	104	72	40	8
31	-	208	176	144	112	80	48	16

Address area for the analog values

Table 4-6 Address area for the analog values of an AS-i slave

Byte no. (start address + offset)	Analog value channel
Start address + 0	Channel 1 / High Byte
Start address + 1	Channel 1 / Low Byte
Start address + 2	Channel 2 / High Byte
Start address + 3	Channel 2 / Low Byte
Start address + 4	Channel 3 / High Byte
Start address + 5	Channel 3 / Low Byte
Start address + 6	Channel 4 / High Byte
Start address + 7	Channel 4 / Low Byte

Analog A / B slaves occupy only a "half address" and therefore have only a maximum of 2 channels.
A slaves occupy bytes 0 to 3 and B slaves bytes 4 to 7 here.

Notes

Example notes for the table "Access to analog values via data records".

- Configuration: Analog slaves with the AS-i addresses 1 to 6
  Use data record 140 and specify 48 as the data record length.
- Configuration: An analog slave with the AS-i address 7
  Use data record 141 and specify 24 as the data record length.
- Configuration: Use of the entire address range with 31 analog slaves
  Use data record 140 and specify 224 as the data record length. In this way, you capture analog slaves 1 to 28. For the remaining analog slaves 29 to 31, use data record 147 in a second job and specify 24 as the data record length.
- Configuration: Analog slaves are in the address range 29 to 31
  Use data record 147 and specify 24 as the data record length.
- Configuration (mixed access): You want to access slaves 1 to 12 with I/O commands and slaves 13 to 31 using a data record
  Use data record 143 for analog slaves 13 to 31.

Note

Representation of the analog values or the transparent values

- The analog values are interpreted as 16-bit values in two's complement
- The transparent values are interpreted as two independent bytes

Please refer to the relevant documentation of the analog slaves for further specifications on the value range, measuring range and accuracy.

4.5.2.2 Special cases in analog value transfer

- The following applies in the input direction (Read_data_record):
  - AS-i slaves in accordance with the following profiles supply $7FFF_H$ as a substitute value:
  - 7.3.4 to 7.3.7
    7.3.B to 7.3.F
    7.4.1 to 7.4.F
    7.A.9
    7.A.8 (ID1 = 6)
    7.A.8 (ID1 = 7)
    7.A.5, 7.5.5 and B.A.5 (if they have analog inputs)
  - AS-i slaves in accordance with the following profiles supply 0000_H as a substitute value:
  - 7.3.0 to 7.3.3
    7.3.8 to 7.3.A
    7.A.A
    7.A.8 (ID1 = 3,4,5)
    7.A.5 and 7.5.5 and B.A.5 (if they have transparent inputs)
  - All other AS-i slaves supply $7FFF_H$ as the substitue value.
- In the output direction (Write_Date_Record), the DP / AS-i F-Link behaves as follows:
  In the case of failure or in the "CLEAR" state of the PROFIBUS DP master (corresponds to the "STOP" state of a PLC), the DP / AS-i F-Link transmits logic "0" to all AS-i slaves.

4.5.2.3 Programming example for analog value call

Example for SIMATIC S7

An analog input value of analog AS-i slave 6 is transferred as an analog output value to analog AS-i slave 9:

```
STL
 L          DB40.DBW     10             //Slave 6, input channel 2
 T          DB40.DBW     32             //Slave 9, output channel 1

 CALL       SFC 59                      //RD_REC
 REQ        :=TRUE
 IOID       :=B#16#54                   //Fixed value
 LADDR      :=W#16#120                  //Start of cyclic input data
 RECNUM     :=B#16#8D                   //DR141 (slave 5 and following)
 RET_VAL    :=MW130                     //Return parameters
 BUSY       :=M129.0                    //Return parameters
 RECORD     :=P#DB40.DBX 0.0 BYTE 32    //Receive buffer (slaves 5 to 8)

 CALL       SFC 58                      //WR_REC
 REQ        :=TRUE
 IOID       :=B#16#54                   //Fixed value
 LADDR      :=W#16#120                  //Start of cyclic input data
 RECNUM     :=B#16#8E                   //DR142 (slave 9 and following)
 RECORD     :=P#DB40.DBX 32.0 BYTE 32   //Send buffer (slaves 9 to 12)
 RET_VAL    :=MW132                     //Return parameters
 BUSY       :=M129.1                    //Return parameters
```

Configuration

5

This chapter tells you how to configure the DP / AS-i F-Link as a PROFIBUS DP master and AS-i master.

- Completely and comfortably with the Object Manager (OM) and the option package Distributed Safety in STEP 7 on a failsafe SIMATIC S7
- Via the GSD file on a failsafe CPU with a PROFIBUS DP master such as the SINUMERIK 840D

You also learn which settings via the operator display on the device are necessary or additionally possible:

- Automatic detection of the pending configuration
- Address assignment via keyboard and display menu
- Teaching of the code sequences of safe AS-i slaves (always necessary)
- Restoration of the basic factory settings

5.1 Overview comparison of the configuration methods

The table below shows the basic functional differences between OM configuring and GSD configuring.

Table 5-1 Functional differences between OM configuring and GSD configuring

Task	OM configuring	GSD configuring
Configuring the AS-i slaves	• Offline/online Inserting AS-i modules into the overview representation of the AS-i address table, display of the assignable slots (Chapter 5.2.6) • Online Acceptance of the pending configuration detected by the DP / AS-i F-Link (Chapter 5.4.3)	Input at the device Saving of the pending configuration detected by the DP / AS-i F-Link (Chapter 5.4.3)
Parameterization and specification of the AS-i slaves	• Siemens modules (fig. 5-17, 5-18): – Selection via order number or AS-Interface catalog – Settings via onscreen dialog – Drop-down lists with plaintext • Non-Siemens modules (fig. 5-16): – Settings via onscreen dialog – Entering the parameter bits according to the manufacturer's documentation	Entering the parameter bits according to the manufacturer's documentation (fig. 5-27)
Parameterizing the ASIsafe slaves	Variable parameter setting (fig. 5-19)	• Specify fixed value for parameter • Parameter value dependent on the AS-i address (Chapter 5.3.4.2)
Teaching the code sequences	• Onscreen dialog (Chapter 5.2.5.5) • Menu selection on the device (Chapter 5.4.6)	Menu selection on the device (Chapter 5.4.6)
Data exchange with analog slaves	• Access via cyclic process data (fig. 5-17 and Chapter 5.2.7.2) • Access via data records (Chapter 4.5.2)	Access via data records (Chapter 4.5.2)

5.2 Configuring with OM in STEP 7

5.2.1 Information on configuring with OM in STEP 7

Note

Safety parameters

The description of the:

- PROFIsafe parameters (e.g. source address) can be found in the section ""PROFIsafe" tab in the "Properties - DP Slave" dialog box
- ASIsafe parameters (e.g. evaluation of sensors) can be found in the case of the relevant ASIsafe slave in the section ""ASIsafe" tab in "Properties - AS-i F-Slave..." dialog box
- You can find the parameters for behavior in the case of failure of an ASIsafe slave in the section ""Operating Parameters" tab in the "Properties DP/AS-i -..." dialog box"

See also

"PROFIsafe" tab in the "DP slave properties " dialog box (Page 5-8)

"ASIsafe" tab in the "Properties - AS-i F-Slave..." dialog box (Page 5-30)

"Operating Parameters" tab in the "Properties - DP/AS-i -..." dialog box (Page 5-17)

5.2.2 Install Object Manager

Download of the Object Manager

The Object Manager for the DP / AS-i F-Link is available free from the Internet address http://support.automation.siemens.com/WW/view/en/24063754 on the "Downloads" tab:

Installation of the Object Manager

Install the Object Manager as follows:

1. Run the file "setup.exe."
2. Follow the installation instructions.

5.2.3 Configuring the PROFIBUS DP master system

Configure the DP / AS-i F-Link as a modular PROFIBUS DP slave in the HW Config of the PROFIBUS DP master.

Procedure

1. Open your STEP 7 project
2. Generate OB 82, OB 85 and OB 86 additionally for the project
3. Open the HW Config of the PROFIBUS DP master
4. Select the DP / AS-i F-Link in the "Hardware Catalog" window.
   Path: PROFIBUS-DP > DP/AS-i > DP/AS-i F-Link > 3RK3141-xCD10 > V1.0
5. Drag & drop the selected DP / AS-i F-Link to the DP master system
   The dialog "Properties - PROFIBUS Interface ..." opens.
6. Set the properties of the PROFIBUS sub-network.
7. Select the PROFIBUS address for the DP / AS-i F-Link
8. Acknowledge the settings with "OK".

Results

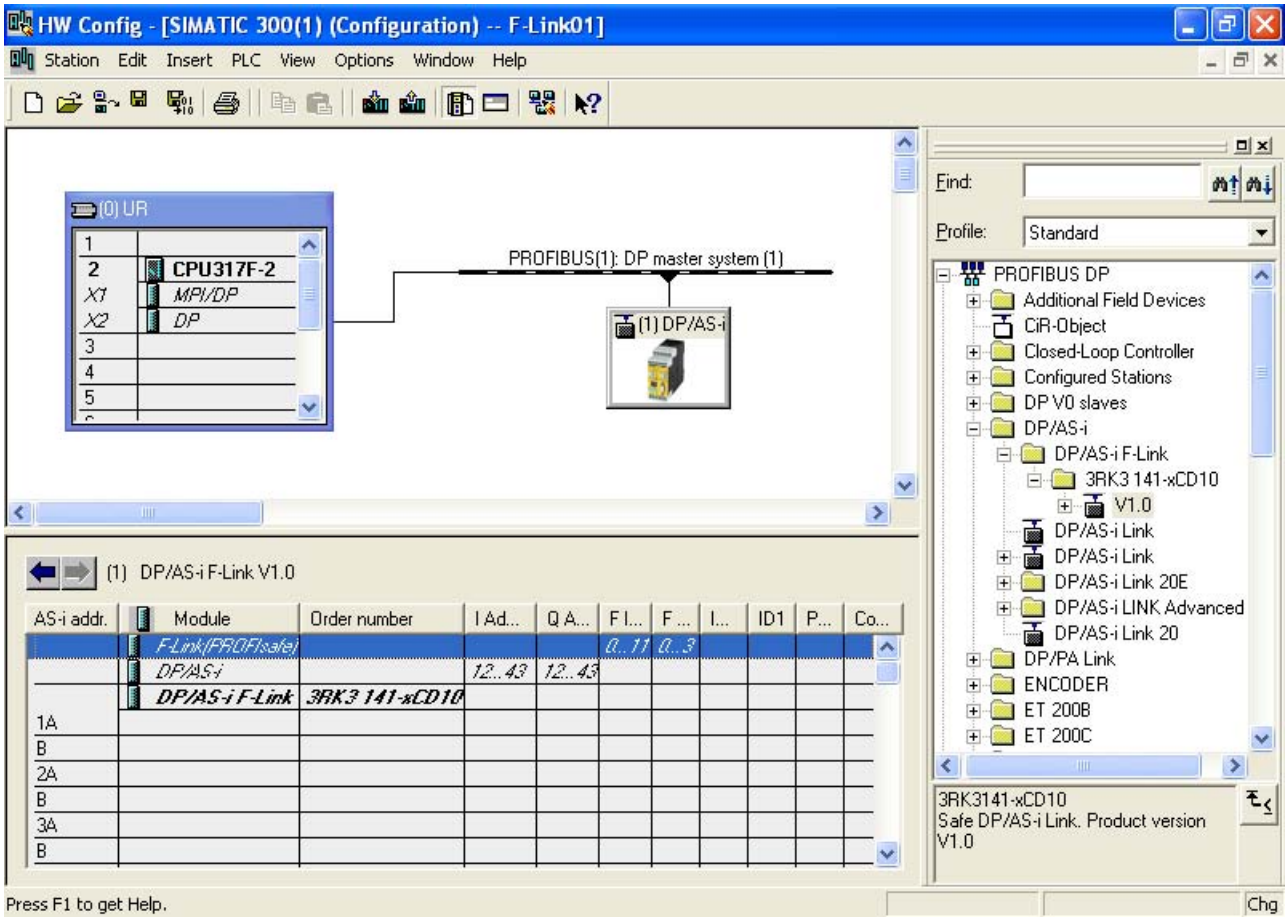


Figure 5-1 Configuration of the DP / AS-i F-Link on the DP master system

A symbol for the DP / AS-i F-Link is appended to the DP master system. In the lower section of the station window, a detailed view of the DP / AS-i F-Link appears with its possible slots or DP IDs. This is followed by the lines of the unassigned AS-i address table.

5.2.4 "DP slave properties " dialog box

Double-click on the symbol of the DP / AS-i F-Link on the DP master system to open the "Properties - DP slave" dialog box with its tabs:

- "General"
- "Identification"
- "PROFIsafe"
- "F addresses"

Make your settings and acknowledge your inputs with "OK" to terminate the dialog.

5.2.4.1 Calling the "DP slave properties " dialog box

On the "General" tab, set the properties of the DP / AS-i F-Link as a node on PROFIBUS DP.

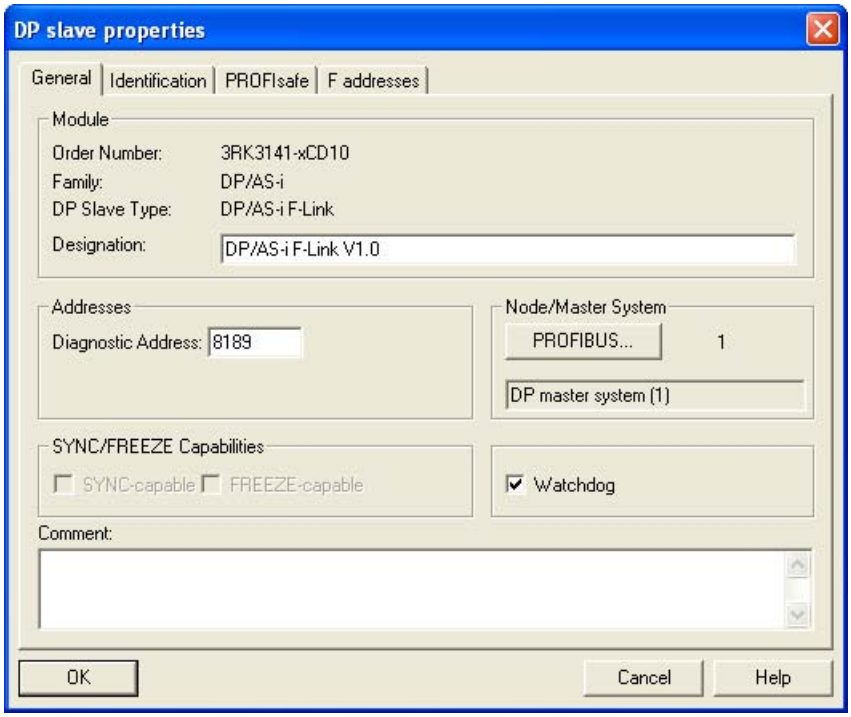


Figure 5-2 Calling the "DP slave properties " dialog box

Module

The fields "**Order number**", "**Family**" and "**DP Slave Type**" show the relevant entries of the DP / AS-i F-Link from the Hardware Catalog of the HW Config. You can change the text field "**Designation**" afterwards.

Addresses

STEP 7 suggests a modifiable "**Diagnostic Address**".

Node/Master System

The PROFIBUS address of the DP / AS-i F-Link and the assigned PROFIBUS DP master are displayed here. Via the "**PROFIBUS**" button, you can modify the PROFIBUS parameter of the DP / AS-i F-Link.

SYNC/FREEZE Capabilities

The control commands "SYNC" and "FREEZE" of the PROFIBUS DP master are not selectable.

Ansprechüberwachung

Activate "**Watchdog**" so that the DP / AS-i F-Link can respond to errors of the PROFIBUS DP master or interruptions to the bus data traffic. If the PROFIBUS DP master does not address the DP / AS-i F-Link within the configured monitoring time, the latter goes to the safe state. All outputs are then set to "0".

Comments

You can enter a freely selectable comment in this text field.

5.2.4.2 "Identification" tab in the "DP slave properties " dialog box

On the "Identification" tab, you can describe the assignment of the DP / AS-i F-Link within the overall plant.

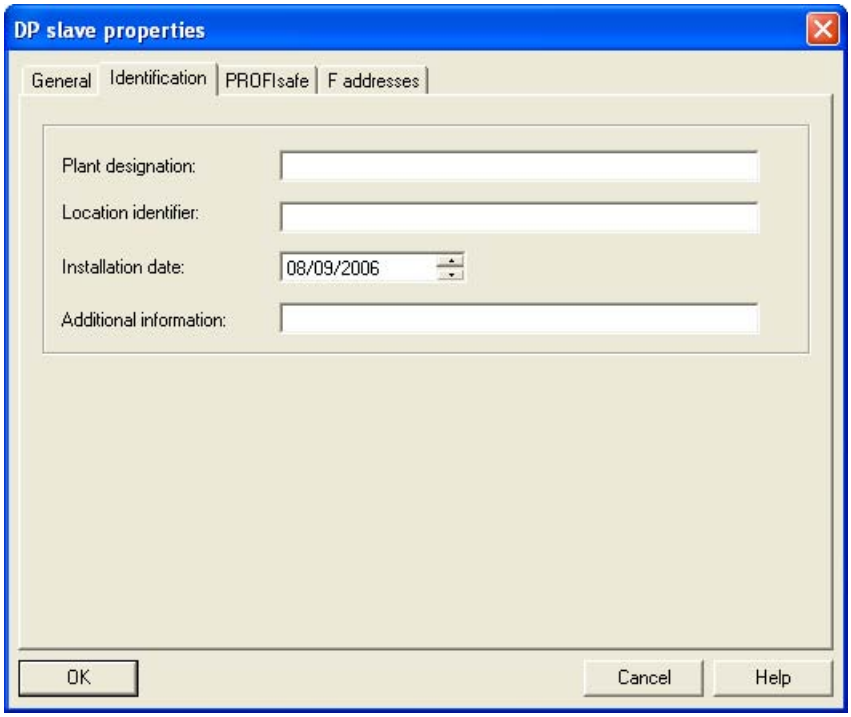


Figure 5-3 "Identification" tab in the "DP slave properties " dialog box

Plant designation

Enter a unique, functional designation of the plant section in this field.

Location identifier

Enter an ID of the installation location of the module as a location identifier that is unique in the entire plant.

Installation date

Select the installation date of the module in this field.

Additional information

Enter additional information here.

5.2.4.3 "PROFIsafe" tab in the "DP slave properties " dialog box

The "PROFIsafe" tab contains the safety-related settings of the DP / AS-i F-Link for the PROFIsafe protocol.

Password for the safety program

For the first access to the parameters of the DP / AS-i F-Link on the "PROFIsafe" tab, you are prompted to create a password. All changes regarding the PROFIsafe settings require that this password be entered. The last password entered is valid for one hour. You can change the password settings later. To do so, open the "Edit Safety Program" dialog box in the "Options" menu of the SIMATIC Manager and click on the "Authorization" button.

Figure 5-4 Entering the password

Parameters of the "PROFIsafe" tab

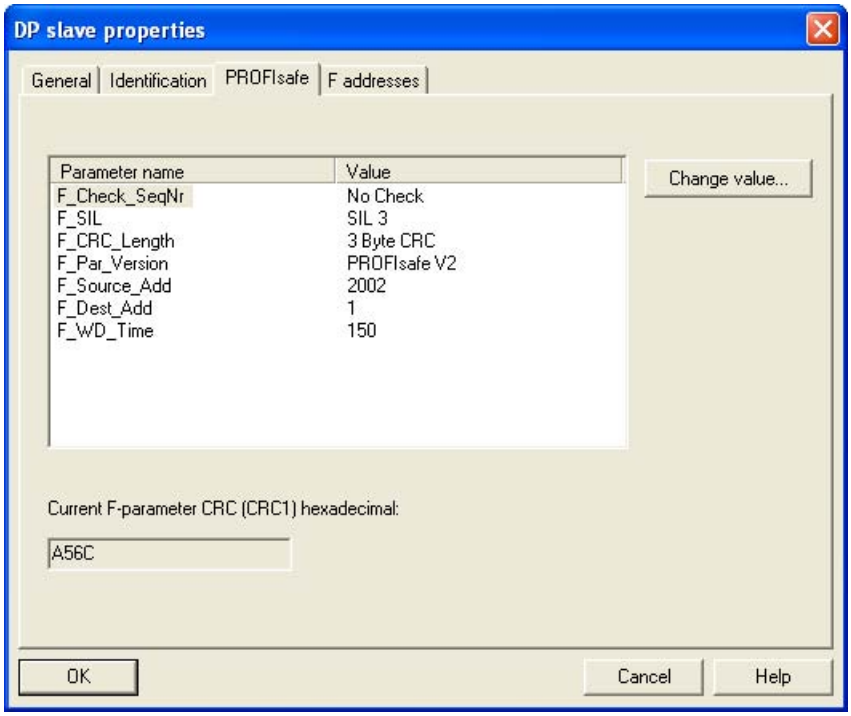


Figure 5-5 "PROFIsafe" tab in the "DP slave properties " dialog box

Modify parameter values by double-clicking on the parameter name or by using the "**Change value...**" button.

Parameter "F_Check_SeqNr"

This parameter defines whether the consistency check (CRC calculation) of the failsafe user data frame takes account of the sequence number.

- In PROFIsafe V1 mode, you must set the parameter permanently to "No Check".
- In PROFIsafe V2 mode, "F_Check_SeqNr" is irrelevant.

Please note here the setting of the PROFIsafe mode in the parameter "F_Par_Version".

Parameter "F_SIL"

The parameter "F_SIL" represents the safety class of the DP / AS-i F-Link.

Parameter "F_CRC_Length"

Set the the parameter "F_CRC_Length" as follows:

- In PROFIsafe V1 mode: "2 Byte CRC"
- In PROFIsafe V2 mode: "3 Byte CRC" (default)

Please note here the setting of the PROFIsafe mode in the parameter "F_Par_Version".

Parameter "F_Par_Version"

The following selection is possible:

- "PROFIsafe V1": You select this setting if the F-CPU supports only PROFIsafe V1.
- "PROFIsafe V2" (default)

Notice

Default

If the network comprises PROFIBUS DP and PROFINET IO subnets, you must set "PROFIsafe V2".

Parameter "F_Source_Add"

The parameter "F_Source_Add" uniquely identifies the PROFIsafe source (PROFIBUS DP master). The value range is between 1 and 65534. Assignment is automatic.

Parameter "F_Dest_Add"

The parameter "F_Dest_Add" uniquely identifies the PROFIsafe destination (DP / AS-i F-Link). The parameter is unique across the network and station-wide. The value range for "F_Dest_Add" is between 1 and 9999. This address must correspond to the F-DP on the device.

Parameter "F_WD_Time"

In the field "F_WD_Time", you set the monitoring time for safety-related communication between the failsafe CPU and the failsafe I/O.
The DP / AS-i F-Link expects a valid safety frame from the failsafe CPU within the monitoring time. As a result, the DP / AS-i F-Link responds safely to failures and faults and can maintain the system in the safe state or transfer the system to the safe state.
Select the monitoring time on the one hand high enough for the communication system to tolerate frame delays. On the other hand, the system must respond fast enough in the event of a fault (e.g. interruption of the communication link).
You can specify the parameter "F_WD_Time" in steps of 1 ms from 10 ms to 10000 ms (default 150 ms).

Current F parameter CRC (CRC1) hexadecimal:

This field shows the hexadecimal coding of the checksum of all selected F parameters.

5.2.4.4 "F addresses" tab in the "DP slave properties " dialog box

Set the basic address of the PROFIsafe slot on the"F addresses" tab.

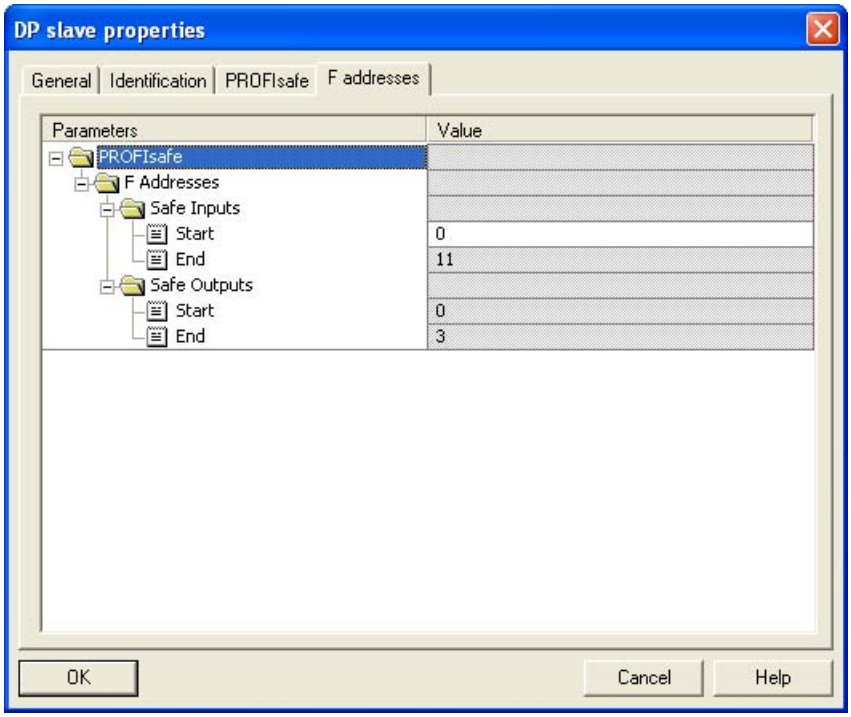


Figure 5-6 "F addresses" tab in the "DP slave properties " dialog box

"F addressess" tab, subfolder "Safe Inputs"

In the "**Start**" line, set the I/O address of the "**Safe Inputs**" or accept the system suggestion. The safe input data require 12 bytes of memory space. The end address appears automatically in the **"End"** line.

"F addresses" tab, subfolder "Safe Outputs"

The I/O address of the "**Safe Outputs**" corresponds to the I/O address of the "Safe inputs" depending on the system. The PIO of the "Safe outputs" has a fixed length of 4 bytes and contains only administration information and no user data.

5.2.5 "Properties - DP/AS-i -..." dialog box (DP/AS-i module)

In the AS-i address table, double-click on the second line with the "DP/AS-i" module. The window with the "Properties - DP/AS-i -..." dialog box opens with the following tabs:

- "General"
- "Digital Addresses"
- "Operating Parameters"
- "AS-i Slave Options"

Make your settings and acknowledge your inputs with "OK" to terminate the dialog.

5.2.5.1 "General" tab in the "Properties - DP/AS-i -..." dialog box

The "General" tab contains the name of the DP / AS-i F-Link.

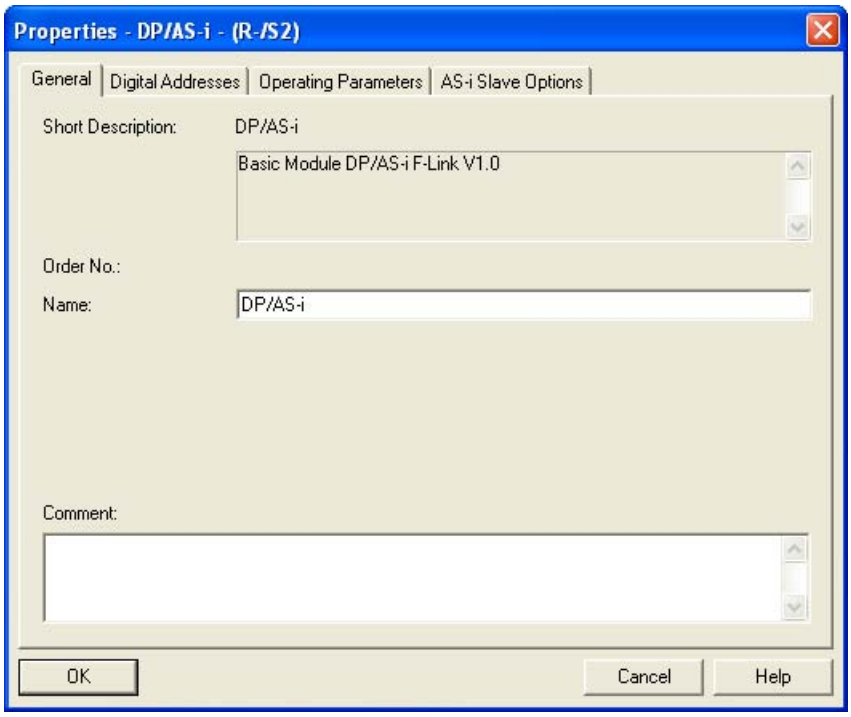


Figure 5-7 "General" tab in the "Properties - DP/AS-i -..." dialog box

In the "**Name**" field, you can assign any name for the AS-i segment. Under "**Comment**", you can store any text (e.g. purpose of use).

5.2.5.2 "Digital Addresses" tab in the "Properties - DP/AS-i -..." dialog box

To configure the address ranges for the binary I/O data of the AS-i slaves, change to the "Digital Addresses" tab.

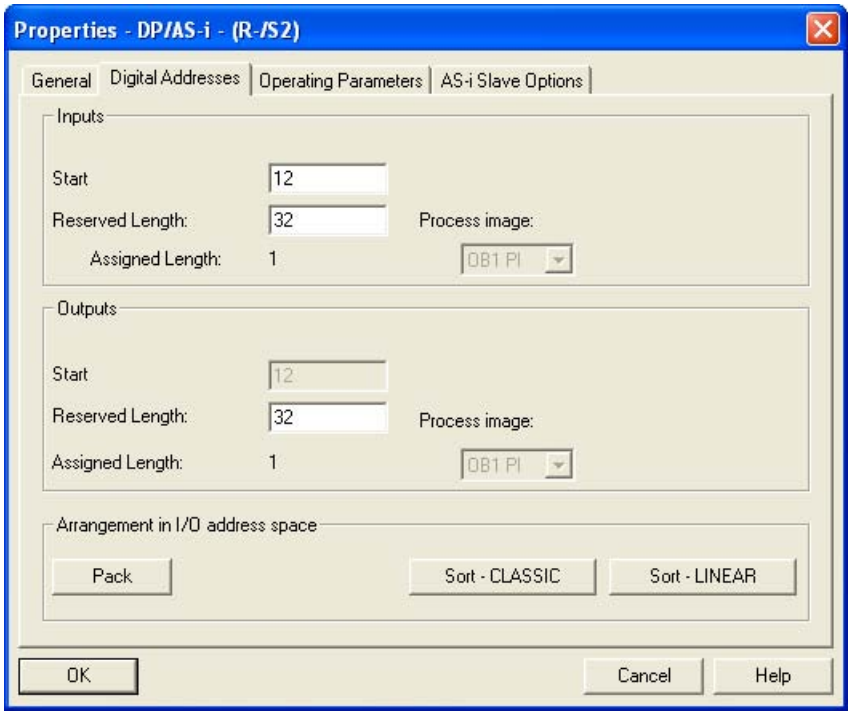


Figure 5-8 "Digital Addresses" tab in the "Properties - DP/AS-i -..." dialog box

Inputs

Digital input addresses refer to a memory area with a maximum size of 32 bytes in which the digital input values of the AS-i slaves are stored. The system suggests the **Start** of the memory area. You can also change the digital input address range.
If the PROFIBUS DP master is a CPU that can administer the partial process images (e.g. CPU 416F), a partial process image number or the OB1 process image for cyclic updating can be selected in the "**Process image**" field.

The "**Reserved length**" can be set for "CLASSIC" sorting. Using this parameter, you can hide unassigned I/O addresses in the rear area of the table or fix a concatenous address range for future expansions on the AS-Interface.
Example of "Reserved length":
If you do not use any B slaves as AS-i slaves with binary inputs and the highest address of a standard slave is "20", you can set the "Reserved length" of the input data to 11.

"**Assigned Length**" shows the actual memory occupied by the AS-i slaves in bytes.

If the entered address range for inputs or outputs is already occupied in HW Config, an error message appears. You can accept the suggestion for the next possible starting address or you can change it.

Outputs

For the digital output addresses, the same starting value as for the input addresses applies depending on the system.

Arrangement in the I/O address space

The "**Pack**" button moves the I/O addresses of the AS-i modules contained in the AS-i address table in such a way that they require as little address space as possible. In addition, the "Reserved length" is optimized.

The "**Sort - CLASSIC**" button (default) moves the I/O addresses in rising order in each case. At the beginning are the standard I/O slaves, followed by the B slaves in order of AS-i addresses.

Table 5-2 "CLASSIC" sorting of the I/O addresses

Byte number [1]	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
m+0	Status nibble / Reserved [2]				Slave 1 / 1A			
m+1	Slave 2 / 2A				Slave 3 / 3A			
m+2	Slave 4 / 4A				Slave 5 / 5A			
m+3	Slave 6 / 6A				Slave 7 / 7A			
m+4	Slave 8 / 8A				Slave 9 / 9A			
m+5	Slave 10 / 10A				Slave 11 / 11A			
m+6	Slave 12 / 12A				Slave 13 / 13A			
m+7	Slave 14 / 14A				Slave 15 / 15A			
m+8	Slave 16 / 16A				Slave 17 / 17A			
m+9	Slave 18 / 18A				Slave 19 / 19A			
m+10	Slave 20 / 20A				Slave 21 / 21A			
m+11	Slave 22 / 22A				Slave 23 / 23A			
m+12	Slave 24 / 24A				Slave 25 / 25A			
m+13	Slave 26 / 26A				Slave 27 / 27A			
m+14	Slave 28 / 28A				Slave 29 / 29A			
m+15	Slave 30 / 30A				Slave 31 / 31A			
m+16	Reserved				Slave 1B			
m+17	Slave 2B				Slave 3B			
m+18	Slave 4B				Slave 5B			
m+19	Slave 6B				Slave 7B			
m+20	Slave 8B				Slave 9B			
m+21	Slave 10B				Slave 11B			
m+22	Slave 12B				Slave 13B			
m+23	Slave 14B				Slave 15B			
m+24	Slave 16B				Slave 17B			
m+25	Slave 18B				Slave 19B			
m+26	Slave 20B				Slave 21B			
m+27	Slave 22B				Slave 23B			
m+28	Slave 24B				Slave 25B			

Byte number 1)	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
m+29	Slave 26B				Slave 27B			
m+30	Slave 28B				Slave 29B			
m+31	Slave 30B				Slave 31B			

Legend:
for 1) m = start address of the input or output data in the PROFIBUS DP master
for 2) Bits 4 to 7 in the first byte of the **input data** are called the status nibble. They are resereved for the command interface of the DP / AS-i F-Link. Bits 4 to 7 in the first byte of the **output data** have no further meaning and are also reserved.

Example of assigning the address area:
The figure below shows the address area occupied by 4 binary AS-i slaves in the PROFIBUS DP master in accordance with "CLASSIC" sorting. In the PROFIBUS DP master, the starting addresses m = 0 are used for the I/O data.
The bits of available AS-i slaves relevant to the user program are shaded in gray.
The white-shaded bits are insignificant to the user program since no AS-i slaves are assigned here.

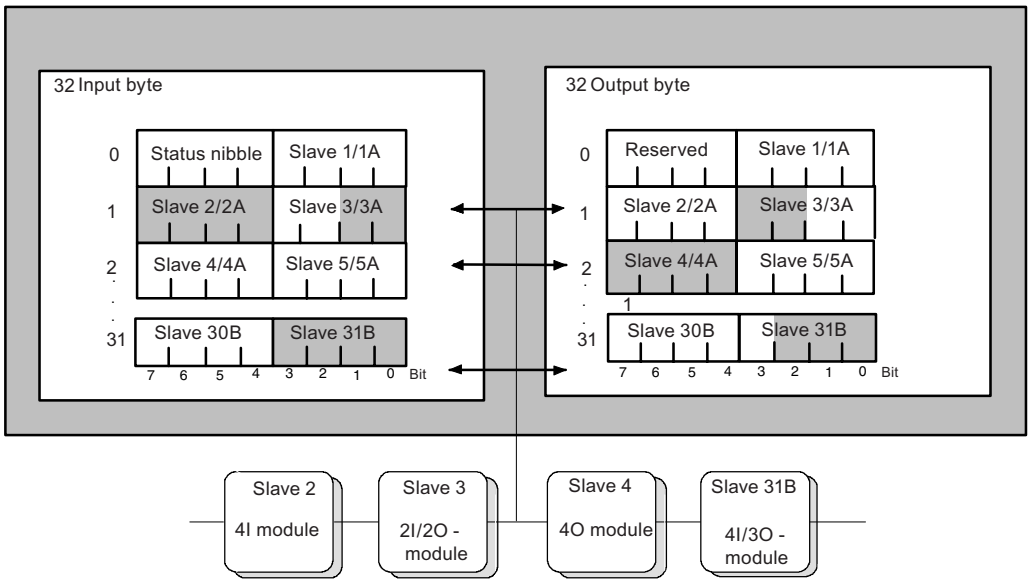


Figure 5-9 Example for assigning the addresses areas of the binary AS-i slaves

In the figure above, the 2I/2O module (AS-i slave No. 3 with two inputs and two outputs) occupies the following:

- Bit 0 and bit 1 in input byte 1
- Bit 2 and bit 3 in ouptut byte 1

The assignment of the AS-i connections of the AS-i slaves to the data bits of the input/output bytes is shown below for slave No. 3:

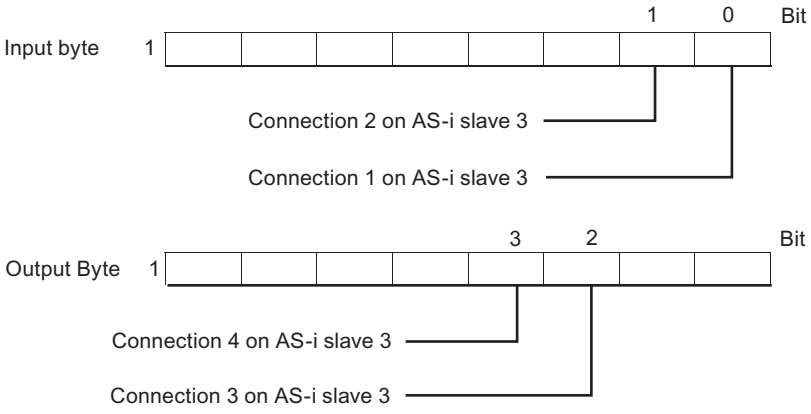


Figure 5-10 Assignment of the AS-i connections of the AS-i slaves to the data bits of the input/output bytes

With a SIMATIC S7 as the PROFIBUS DP master, you access these AS-i binary values via single bit commands:

```
A I 1.0        //Connection 1 on AS-i module 3
= Q 1.3        //Connection 4 on AS-i module 3
```

The "**Sort - LINEAR**" button moves the I/O addresses in rising order. Standard/A slave and B slave on one AS i address are combined in one byte (standard/A slave in the low nibble, B slave in the high nibble).

Table 5-3 "LINEAR" sorting of the I/O addresses

Byte number [1]	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
m+0	Status nibble / Reserved [2]				Reserved			
m+1	Slave 1B				Slave 1 / 1A			
m+2	Slave 2B				Slave 2 / 2A			
m+3	Slave 3B				Slave 3 / 3A			
m+4	Slave 4B				Slave 4 / 4A			
m+5	Slave 5B				Slave 5 / 5A			
m+6	Slave 6B				Slave 6 / 6A			
m+7	Slave 7B				Slave 7 / 7A			
m+8	Slave 8B				Slave 8 / 8A			
m+9	Slave 9B				Slave 9 / 9A			
m+10	Slave 10B				Slave 10 / 10A			
m+11	Slave 11B				Slave 11 / 11A			
m+12	Slave 12B				Slave 12 / 12A			
m+13	Slave 13B				Slave 13 / 13A			
m+14	Slave 14B				Slave 14 / 14A			

Byte number [1)]	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
m+15	Slave 15B				Slave 15 / 15A			
m+16	Slave 16B				Slave 16 / 16A			
m+17	Slave 17B				Slave 17 / 17A			
m+18	Slave 18B				Slave 18 / 18A			
m+19	Slave 19B				Slave 19 / 19A			
m+20	Slave 20B				Slave 20 / 20A			
m+21	Slave 21B				Slave 21 / 21A			
m+22	Slave 22B				Slave 22 / 22A			
m+23	Slave 23B				Slave 23 / 23A			
m+24	Slave 24B				Slave 24 / 24A			
m+25	Slave 25B				Slave 25 / 25A			
m+26	Slave 26B				Slave 26 / 26A			
m+27	Slave 27B				Slave 27 / 27A			
m+28	Slave 28B				Slave 28 / 28A			
m+29	Slave 29B				Slave 29 / 29A			
m+30	Slave 30B				Slave 30 / 30A			
m+31	Slave 31B				Slave 31 / 31A			

Legend:
for 1) m = start address of the input or output data in the PROFIBUS DP master
for 2) Bits 4 to 7 in the first byte of the **input data** are called the status nibble. They are resereved for the command interface of the DP / AS-i F-Link. Bits 4 to 7 in the first byte of the **output data** have no further meaning and are also reserved.

5.2.5.3 "Operating Parameters" tab in the "Properties - DP/AS-i -..." dialog box

"Operating Parameters" offers options for the behavior of the DP / AS-i F-Link.

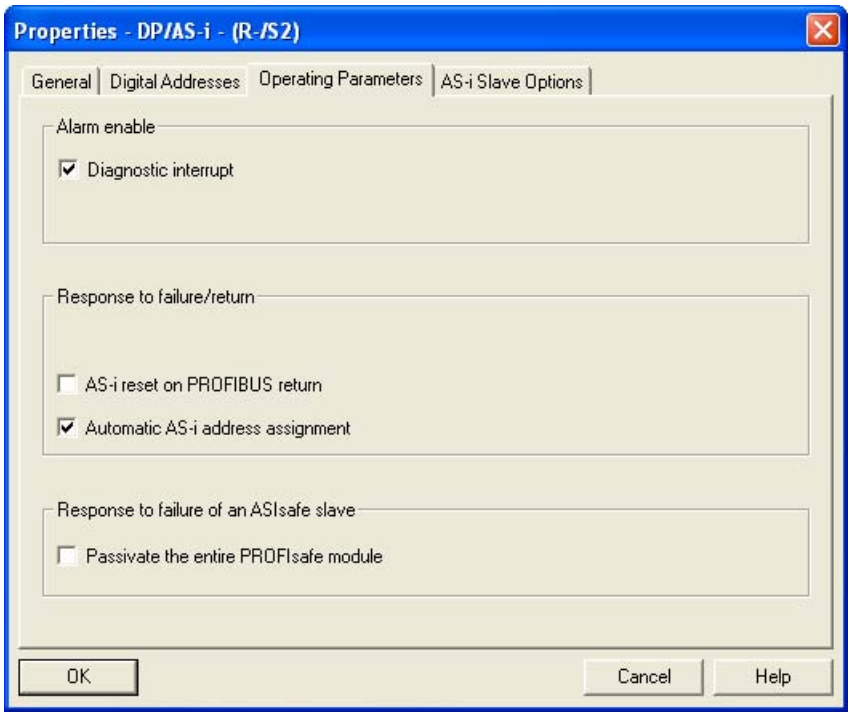


Figure 5-11 "Operating Parameters" tab in the "Properties - DP/AS-i -..." dialog box

Alarm enable

Activate Alarm enable for **Diagnostic interrupt** (OB82) (default: activated).

Diagnostics interrupts are triggered by the following faults:

- Code sequence error
- Group fault (SF)
- Internal fault (= device fault)
- External fault (e.g. AS-i slave failed)
- At least one AS-i slave deviates from the default
- Voltage on AS-i bus too low (AS-i Power Fail, APF)
- Hardware fault (internal watchdog)
- defective EEPROM

Response to failure/return

In the event of a PROFIBUS failure (BUS fault), the DP / AS-i F-Link continues to operate as AS-i master. The inputs are scanned cyclically but the outputs switch off.
When PROFIBUS is restored, the DP / AS-i F-Link receives restart parameters again and changes to protected operation.

If the option "**AS-i reset on PROFIBUS return**" is activated, a PROFIBUS restart always results in reset on the AS-Interface. Arrival of the frames for parameterization and configuration data from the PROFIBUS DP master results in the AS-i message frame traffic being stopeed and restarted.
In the case of deactivation (default), the DP / AS-i F-Link checks at PROFIBUS restart what deviations exist between the data in the parameterization and configuration frame and the actual data. The comparison is the basis for the following responses:

- If all the data are identical, a reset on the AS-Interface results
- If parameter bits of the AS-i slaves are not identical, only these are updated
- More extensive deviation results in a reset on the AS-Interface

If the property "**Automatic AS-i address assignment**" is set (default), a failed AS-i slave can be replaced by a new, identical slave with the address "0" (factory status). The DP / AS-i F-Link automatically assigns the address of the predecessor to the new slave. When the property is deactivated, you must program the address manually into the new slave when replacing slaves.

"Response to failure of an ASIsafe slave"

The option "**Passivate the entire PROFIsafe module**" means that following a fault on a safety-related channel (ASIsafe slave), all safe data (PROFIsafe frames) are passivated. Exchange of non-safe data is not affected by this.
Without the option, passivation of safe data exchange takes place only on faulty channels, and the the non-faulty channels (ASIsafe slaves) continue in operation.

See also

Replacing an AS-i slave/automatic address programming (Page 8-14)

5.2.5.4 "AS-i Slave Options" tab in the "Properties - DP/AS-i -..." dialog box

You can execute the following actions on the "AS-i Slaves Options" tab:

- Acceptance of the actual AS-i slave configuration detected by the DP / AS-i F-Link
- Teaching of the code sequences of the ASIsafe slaves

The actions on this tab require an online connection with the DP / AS-i F-Link.

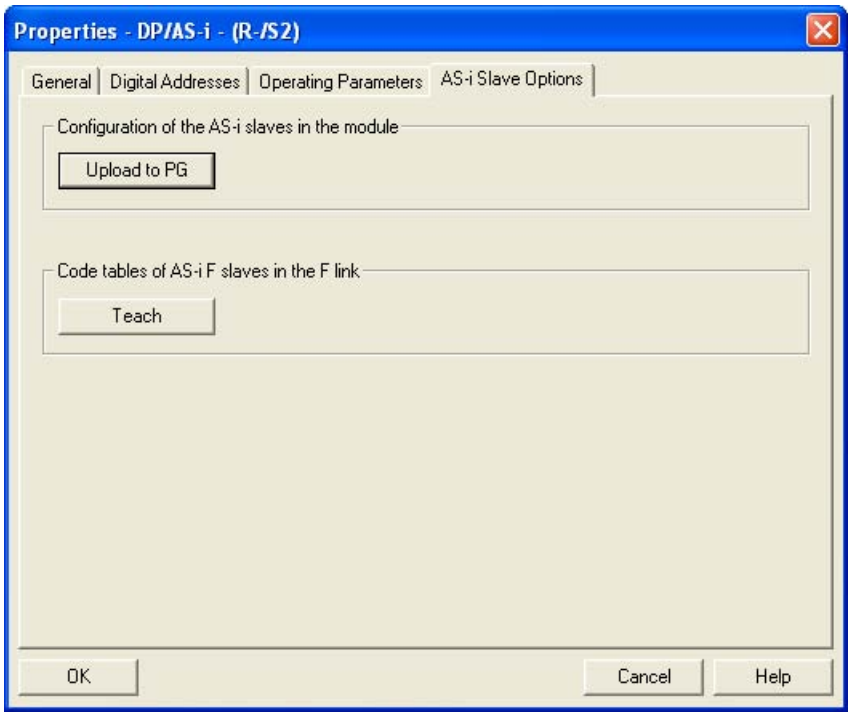


Figure 5-12 "AS-i Slave Options" tab in the "Properties - DP/AS-i -..." dialog box

Configuration of the AS-i slaves in the module

The function "**Upload to PG**" fills the AS-i address table with the profile codes (IO, ID, ID1, ID2) of the AS-i slaves currently detected by the DP / AS-i F-Link. This actual configuration can differ from the desired configuration stored in the DP / AS-i F-Link if, for example, an AS-i slave has been added or removed after configuration. Existing entries in the AS-i address table are overwritten with placeholders in accordance with the profile codes. However, set parameters are retained.
You can modify the uploaded configuration and save it as a default in the PROFIBUS DP master. This function makes it possible for you to read in a complex configuration in a user-friendly way and use it as the basis for further OM configuration.

Code tables of the AS-i F slaves in the F link

With the function "**Teach**", you read the code sequences of all connected and configured ASIsafe slaves into the DP / AS-i F-Link.

Note

Teaching the code sequences on the device

You can also execute Teaching of the code sequences direct on the DP / AS-i F-Link. Please note here the section "Making settings and operator inputs on the device" in the chapter "Configuring".

Note

Closing input contacts of the ASIsafe slaves

Before starting the Teaching function, close all input contacts of the ASIsafe slaves.

See also

Settings and operator inputs using the display menu (Page 5-46)

5.2.5.5 "Teach Code Tables" dialog box

You open the "Teach Code Tables" dialog box using the "Teach" button on the "AS-i Slaves Options" tab.

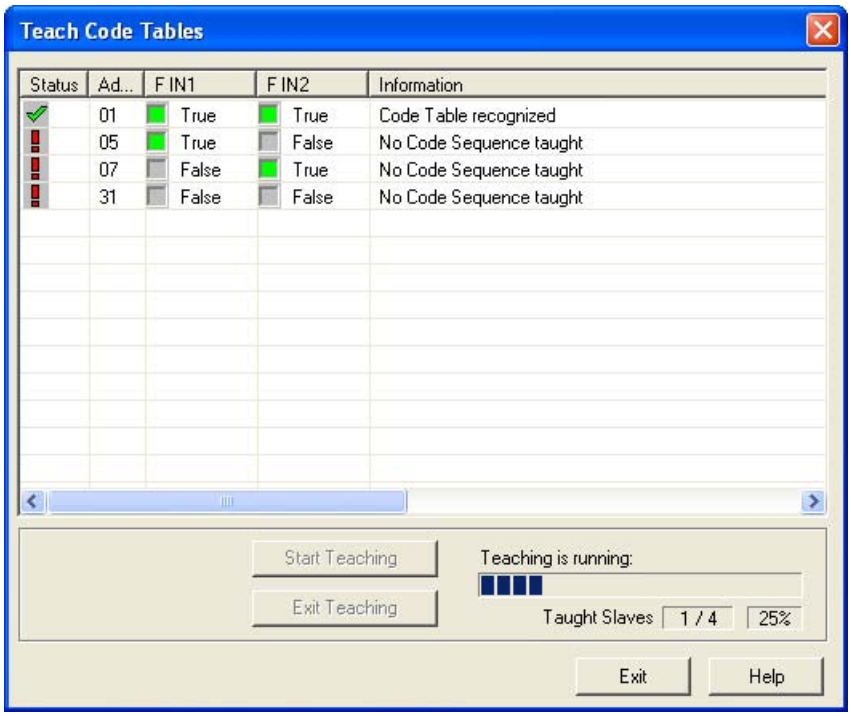


Figure 5-13 "Teach Code Tables" dialog box

Information table

This table shows the addresses of the ASIsafe slaves with the associated status information.

The column "**Status**" contains a symbol for the current status of the code sequence recognition. You can sort the information table according to "Status" by clicking on the relevant field in the table header.
See the table below for the meaning of the displayed icons.

Table 5-4 Status displays when teaching code sequences

Status	Meaning
	Code sequence recognized. ASIsafe slave is active. No fault reported.
	Code sequence recognized. ASIsafe slave not active or I/O fault reported.
	Fault reported
 PF PF PF	I/O fault: Please refer to the slave's operating instructions. Check the slave status accordingly.

The AS-i addresses of the ASIsafe slaves are listed in the column "**Addr.**" according to the assignment in the AS-i address table. You can sort the information table again according to addresses (default) by clicking on "Addr." in the table header.

The statuses of the safe inputs are displayed in the columns "**F-IN1**" and "**F-IN2**".
See the table below for the meanings of the displayed icons.

Table 5-5 Status displays of the safe inputs

Icon	Text	Meaning
	true	Switch closed
	false	Switch open
	Fault	Lack of information; ASIsafe slave does not respond or is not polled

The column "**Information**" contains one or more notes in plaintext for each address.

Buttons and progress bar

The "**Start Teaching**" button initiates reading in of the code sequences of the ASIsafe slaves. A progress bar indicates the time taken. A cyclic status scan updates the progress bar and the contents of the information table every second. During this operation, PROFIsafe communication is quasi passivated. The DP / AS-i F-Link continues to monitor the I/O of the AS-Interface as AS-i master . On the device display, "c" appears on the left of the second line and the next higher AS-i address of the slave whose code sequence is being taught is displayed right-justified. Following successful conclusion of Teaching, the button "Complete Teaching" is enabled.

With the button "**Complete Teaching**", start resumption of PROFIsafe communication.

You can quit the dialog with the "**Exit**" button. Teaching of the code sequences continues independently of this.

5.2.6 AS-i address table

5.2.6.1 Structure of the AS-i address table

The AS-i address table shows an overview of all AS-i slaves configured on the DP / AS-i F-Link.

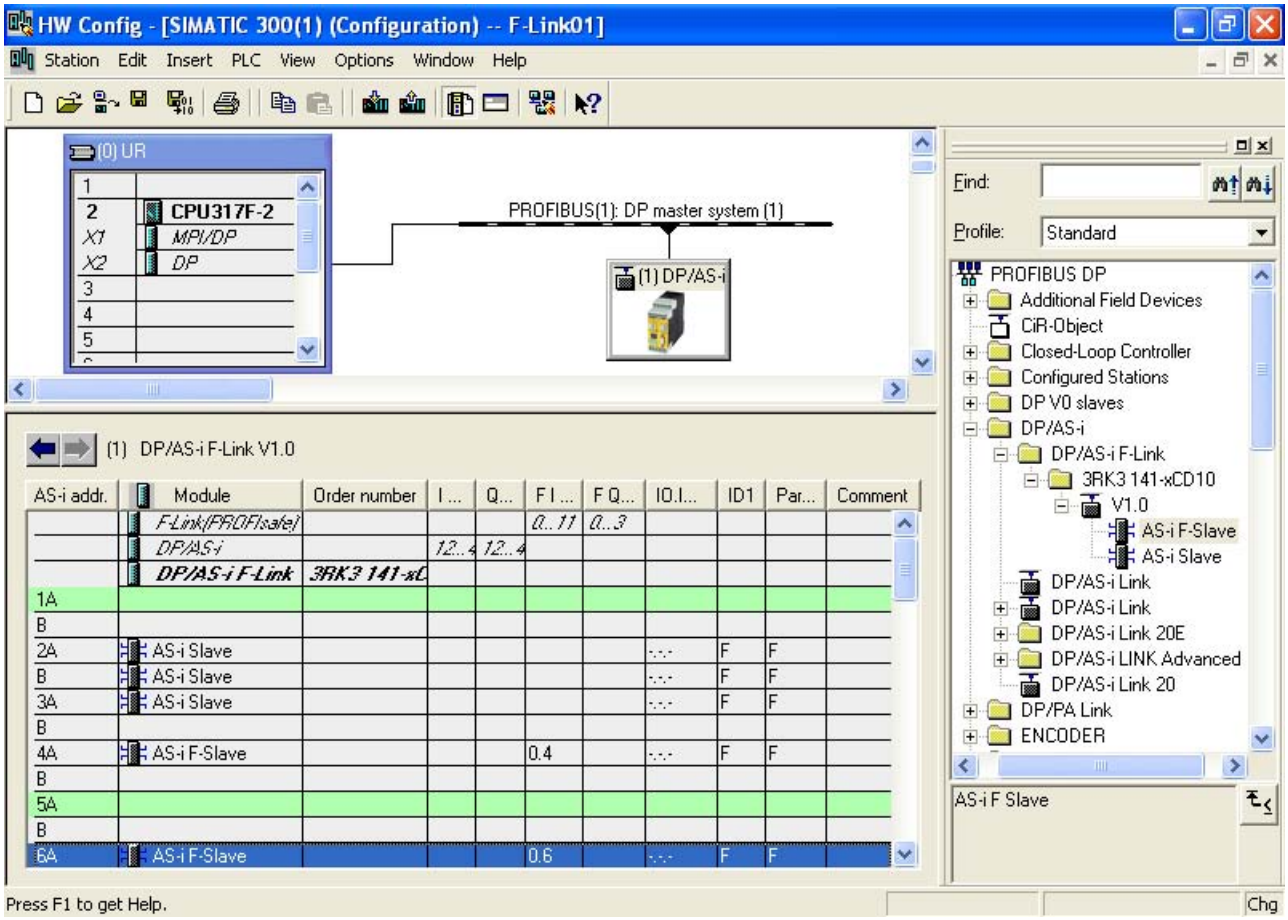


Figure 5-14 AS-i address table occupied by placeholder modules

The first line of the table contains address space information for the safety-related binary signals. The second line contains address information for the binary signals.
A doubleclick on the second line opens the "Properties - DP/AS-i -..." dialog.
The entries for the AS-Interface modules begin with AS-i address 1A. For each AS-i address there is one line for standard/A slaves and one line for B slaves. The relevant table columns contain the following information from the tabs of the "Properties - AS-i Slave -..." dialog box:

- The column "**AS-i addr.**" contains a line for each possible AS-i slave address: 1A, B, 2A, B, 3A, B, ..., 30A, B, 31A, B
- The column "**Module**" shows the entry in the "Name" field on the "General" tab or the name of a placeholder module (AS-i F sslave, AS-i slave)
- The column "**Order number**" shows the entry in the "Order number" field on the "General" tab
- The column "**I address**" shows the occupied digital input address space in the case of digital and mixed (digital-analog) AS-i slaves, and the occupied analog input address space in the case of analog AS-i slaves
- The column "**Q address**" shows the occupied digital output address space in the case of digital and mixed (digital-analog) AS-i slaves, and the occupied analog output address space in the case of analog AS-i slaves
- The column "**F I address**" shows the occupied PROFIsafe input address space in the case of ASIsafe slaves
- The column "**F Q address**" shows the occupied PROFIsafe output address space in the case of ASIsafe slaves
- The column "**IO.ID.ID2**" shows IO code, ID code and ID2 code of the AS-i slave
- The column "**ID1**" shows the ID1 code of the AS-i slave
- The column "**Parameters**" shows the hexadecimal value of the parameter bits of the AS-i slave
- The column "**Comment**" contains the editable comment on the an AS-i slave on the "General" tab

5.2.6.2 Filling the AS-i address table

If you have not yet filled the lines of the AS-i address table using the "Load into PG" function, you can supplement the table with placeholder modules and specify them later. The Object Manager checks possible destination addresses and represents the relevant lines against a green background. You have the following options available to you:

- Drag & drop an AS-i slave from the Hardware Catalog (PROFIBUS-DP > DP/AS-i > DP/AS-i F-Link > 3RK3141-xCD10 > V1.0 > AS-i F slave or AS-i slave)
- Selection of an AS-i slave via the context menu "Insert Object..." (V1.0 > AS-i F slave or AS-i slave)
- Copying and inserting via the clipboard
- Moving the contents of the line while holding down the left mouse key. This changes the AS-i address of a configured slave.

Address assignments

Observe the following rules for assigning addresses:

- ASIsafe slaves (AS-i F slaves) use a full AS-i address (A and B address line)
- Many AS-i slaves (e.g. CTT5) require 2, 3 or 4 consecutive addresses depending on type. Subsequent addresses must be kept free accordingly. Note here the assignment of the possible start addresses in the table below.

Table 5-6 Start addresses in the case of multiple address assignment

Number of occupied addresses	Possible start addresses
2	1 … 30
3	1 … 29
4	1 … 28

5.2.7 "Properties - AS-i Slave..." dialog box (or AS-i F slave)"

To specify the placeholder modules or for changing the AS-i slave parameters, open the "Properties - AS-i Slave -..." or "Properties - AS-i F Slave -..." dialog box in the following ways:

- Double-click on an assigned address line
- Click on the context menu "Object Properties...".

The following tabs are available:

- "General"
- "Configuration"
- "ASIsafe", when selecting an ASIsafe slave

Make your settings and acknowledge your inputs with "OK" to terminate the dialog.

5.2.7.1 "General" tab in the "Properties AS-i Slave -..." dialog box

The "General" tab contains specifications concerning the AS-i slave as a node on the AS-Interface.
Specify the placeholder module in the AS-i address table first on "Configuration" tab.

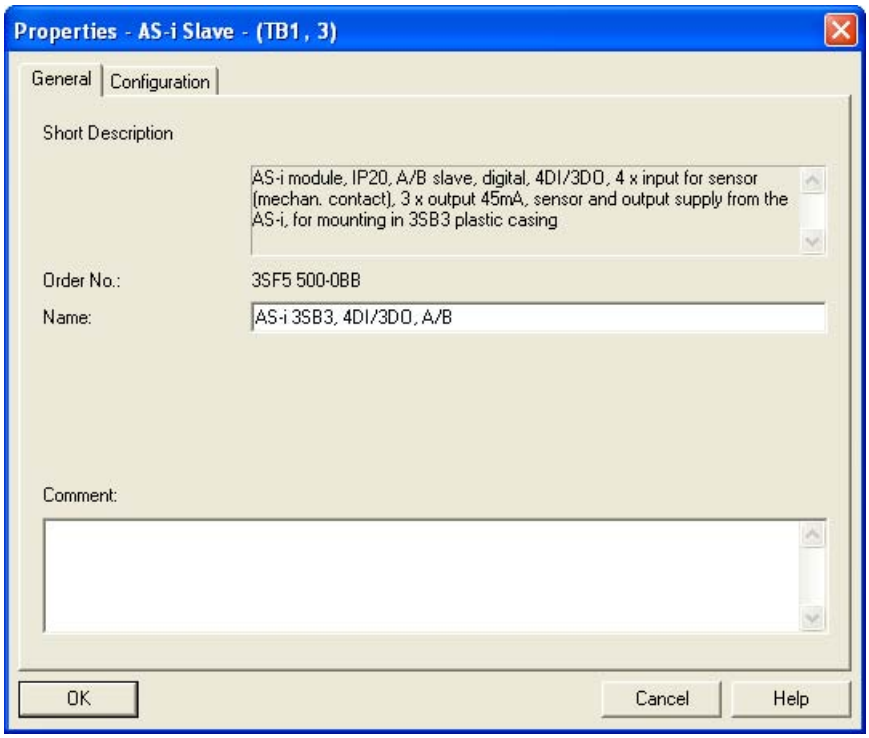


Figure 5-15 "General" tab in the "Properties AS-i Slave -..." dialog box

Short description

After configuration, the short description shows the text of the relevant placeholder module (AS-i slave or AS-i F slave). The output box contains the description of the AS-i slave from the AS-Interface catalog ("Configuration" tab -> Select...).

Order No.

The order number or the text for an AS-i slave universal module is shown in this field.

Name

This editable field is pre-assigned with the entry from the AS-Interface catalog.

Comments

You can enter a comment in this text field.

5.2.7.2 "Configuration" tab in the "Properties AS-i Slave -..." dialog box

On the "Configuration" tab, you select the AS-i slaves and enter corresponding parameters.

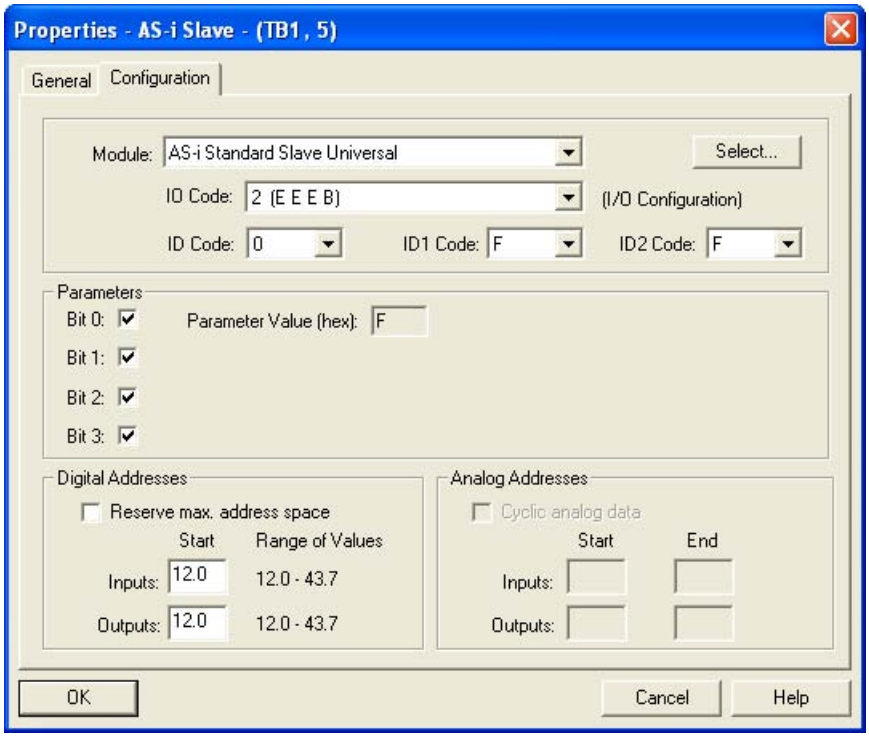


Figure 5-16 "Configuration" tab in the "Properties AS-i Slave -..." dialog box

Module

If a placeholder module is selected in the line of the AS-i address table, an "AS-i standard slave universal" or an "AS-i A / B slave universal" appears in the drop-down list in accordance with the address assignments.
Specify these placeholder modules or overwrite an existing AS-i slave in the following ways:

- Selection of a Siemens module in the drop-down list using the order number.

  Please note here the section ""Configuration" tab (Siemens module) in the "Properties - AS-i Slave -..." dialog box

- Selection of a Siemens module using the **"Select..."** button.

  Please note here the section "Slave selection for Siemens slaves"

- Setting the IO codes, ID codes and parameter bits in accordance with manufacturer documentation

IO code, ID code, ID1 code, ID2 code

Select the hexadecimal identification code in accordance with the documentation on the AS-i slaves. Please note the following:

- ASIsafe slaves have the ID code B_H. This code cannot be selected for other slaves.
- A / B slaves have the ID code A_H.
- In the case of A / B slaves, the ID1 code for the associated B slave appears in brackets along with the ID1 code for the A slave
- For AS-i slaves that do not support ID1 and ID2 codes, select the values F_H

Parameters

Activate bits 0 to 3 in accordance with the documentation on the AS-i slaves. The parameter value shows the bit combination additionally as a hexadecimal number.
In the case of an A / B module, the checkbox for parameter bit 3 is hidden.

Digital Addresses

The system suggests an input and output address range for digital data exchange. For a digital AS-i slave that has no inputs or outputs, the relevant input field is unoccupied.
If you activate the checkbox "**Reserve max. address space**", 4 bits of input addresses and 4 bits of output addresses are made available for the AS-i slave in the I/O memory. You can use the additional memory for data exchange in user programs.

Analog Addresses

Select the option "**Cyclic analog data**" for transferring analog data via cyclic PROFIBUS DP services. The system suggests an input and output address range.

With a SIMATIC S7 as the PROFIBUS DP master, you access these AS-i analog values with word commands.
Example: I/O address 256 is assigned to channel 1 of an analog output slave

```
L 5000          //Load value
T PQW256        //Transfer value to analog output
```

The assigned address space is checked before accepting the configuration. If this assigment is not possible, a warning message appears and the "Configuration" tab opens again.

5.2.7.3 "Configuration" tab (Siemens module) in the "Properties - AS-i Slave -..." dialog box

You can select AS-i slaves from Siemens by their order numbers using the drop-down list for module selection. There are default settings of the codes and parameters for this selection.

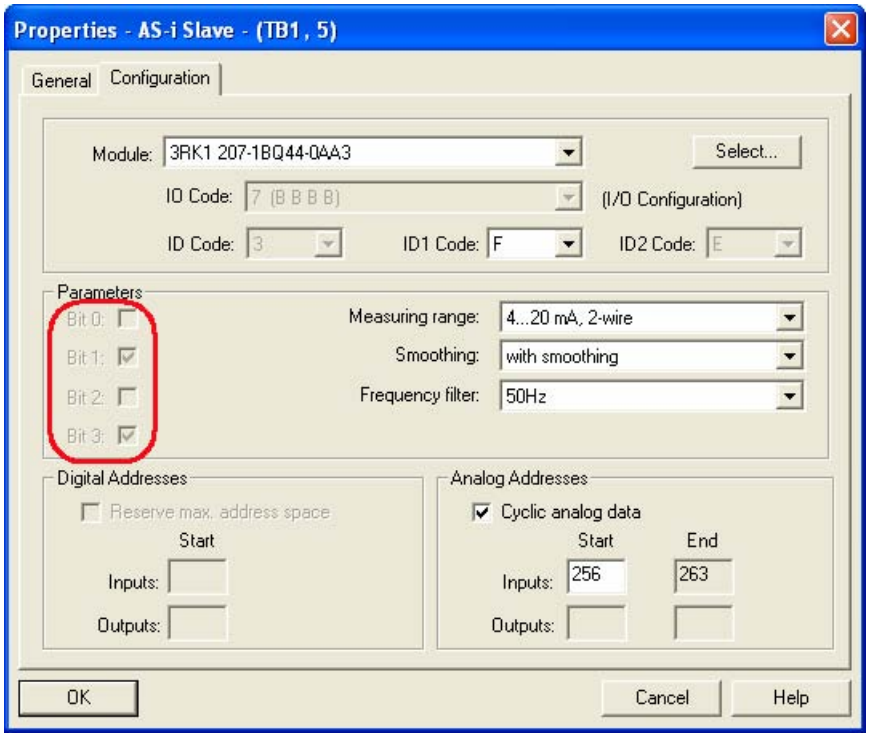


Figure 5-17 "Configuration" tab (Siemens module) in the "Properties - AS-i Slave -..." dialog box

IO code, ID code, ID1 code, ID2 code

The IO code, ID code and ID2 code are fixed by the properties of the Siemens modules. By contrast, you can modify the ID1 code on some modules.

Parameters

The Bit checkboxes of the "Parameter" group cannot be modified individually. Assignments here result from the entries in the adjacent fields.

Digital Addresses and Analog Addresses

The procedure for assigning digital and analog addresses corresponds to that for configuring a placeholder module.

5.2.7.4 Slave selection for Siemens slaves

The slave selection dialog offers a user-friendly method of selecting a Siemens AS-i slave from the AS-Interface catalog.

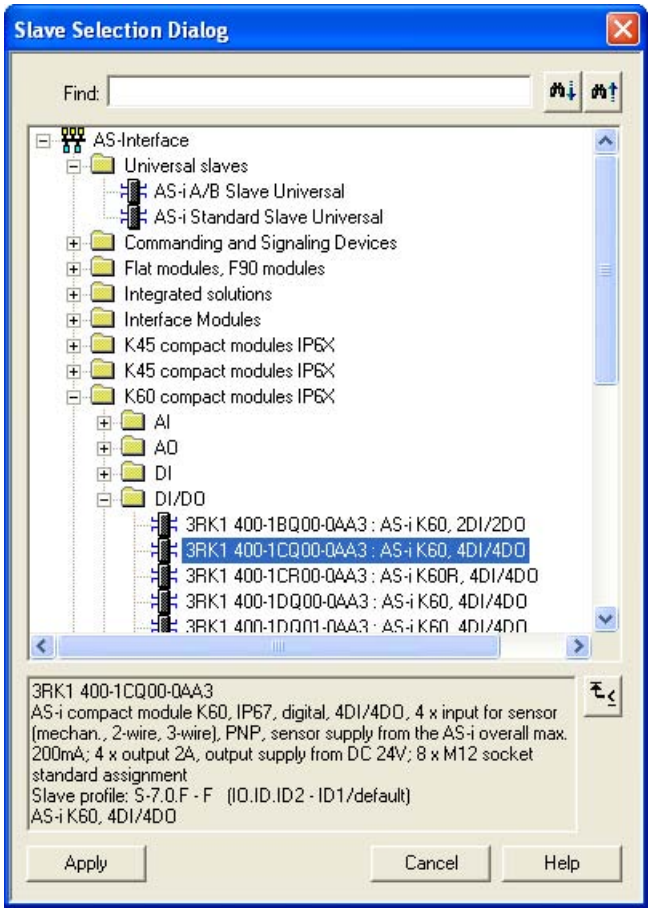


Figure 5-18 Slave Selection Dialog

The following methods of selecting the AS-i slaves are available:

- Navigation through the hierarchic folder structure according to module type
- Search function using a keyword from the information text (e.g. ASIsafe)

A selectable module is adopted into the configuration by double-clicking or by marking it and confirming with the "Apply" button.

5.2.7.5 "ASIsafe" tab in the "Properties - AS-i F-Slave..." dialog box

Parameterize the safety settings of ASIsafe slaves on the "ASIsafe" tab.

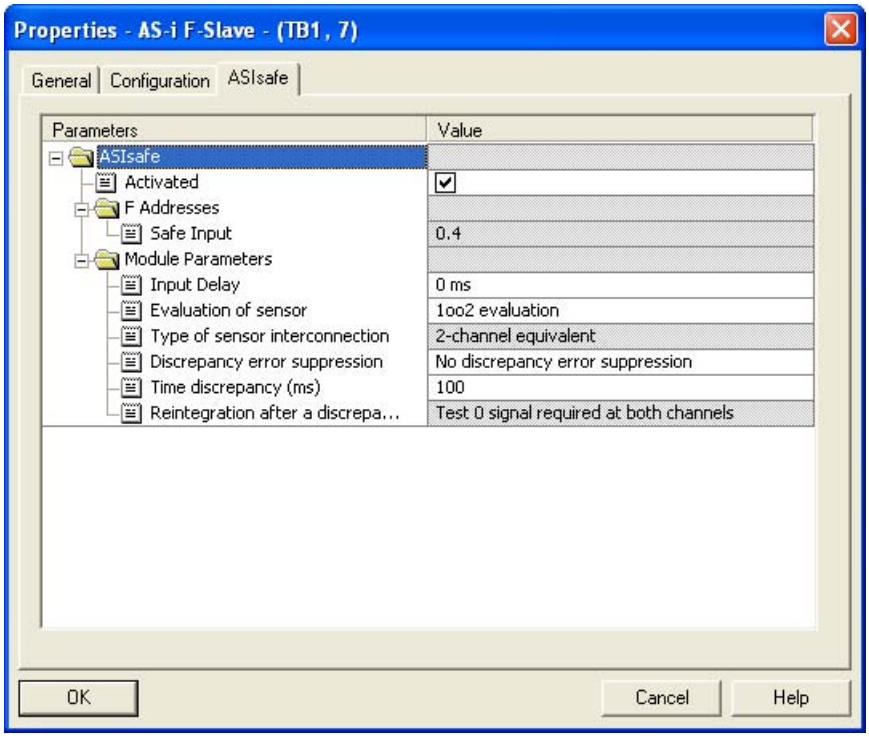


Figure 5-19 "ASIsafe" tab in the "Properties - AS-i F-Slave -..." dialog box

Enabled

If the checkbox is activated, the ASIsafe slave is enabled for signal processing in the safety program. Otherwise, the ASIsafe slave is deactivated for safety purposes in the DP / AS-i F-Link.
Deactivation is required, for example, for an ASIsafe slave that is assigned to an additional safety monitor on the AS-Interface.

F Addresses/Safe Input

This line shows the bit position of the ASIsafe slave within the safe PII that is set on the "F addresses" tab ("DP slave properties " dialog box).

Module Parameters/Input Delay (ms)

To suppress interference, set module-wide input delay for an ASIsafe slave. This suppresses burst interference from 0 ms to 150 ms The input delay can be subject to a tolerance value. Please note the operating instructions of the failsafe modules. The high input delay suppresses longer burst interference; a low input delay suppresses briefer burst interference. The default value is 0 ms.
The input delay has a cumulative effect on the system response time. Please note the section "Response times" in the chapter "Technical data".

Module Parameters/Evaluation of sensor

The following options are possible:

- In the case of "1oo1 evaluation", the sensor is available once and has a single-channel connection to the first input of the ASIsafe slave. For this, you jumper the second input of the ASIsafe slave. Instead of the jumper, you can also connect a second single-channel sensor to the second input. Only if both inputs supply ONE signals does the DP / AS-i F-Link forward a resulting ONE signal to the PLC.
- In the case of "2oo2 evaluation" (default), both inputs of the ASIsafe slave are occupied by one two-channel sensor or by two single-channel sensors. Functionally, the two single-channel sensors belong together as a pair.

Module Parameters/Type of sensor interconnection

In the case of "2oo2 evaluation" only

Information: The type of sensor interconnection is "2-channel equivalent".

Module Parameters/Discrepancy error suppression

Only in the case of "2oo2 evaluation" of the sensors

If you use one two-channel or two single-channel sensors that acquire the same physical process variables, the sensors access each other with a delay. This delay results from the sensor arrangement or the limited accuracy.
The discrepancy analysis examines the course over time of two failsafe input signals with the same functionality. The discrepancy analysis starts as soon as the system detects a discrepancy. The following conditions are available for selection:

- No discrepancy error suppression (default)

  The discrepancy analysis starts as soon as signals are pending on channels 1 and 2
- Discrepancy error suppression "with 0 signal on channel 1"

  The discrepancy analysis starts as soon as a 1 signal is pending on channel 1 and a 0 signal on channel 2
- Discrepancy error suppression "with 0 signal on channel 2"

  The discrepancy analysis starts as soon as a 1 signal is pending on channel 2 and a 0 signal on channel 1

During the module-internal parameterized discrepancy time, the value "0" is made available to the safety program in the F-CPU for the affected ASIsafe slaves. If the difference has not disappeared within the parameteizable discrepancy time, there is a discrepancy error and a diagnostics message follows.

Module Parameters/Time discrepancy (ms)

Only in the case of "2oo2 evaluation" of the sensors

Enter the discrepancy time for a channel pair in this line. Select a large enough discrepancy time so that in fault-free cases, the difference between the two signals disappears before expiry of the discrepancy time. The values are within the range 100 ms (default) to 2500 ms with an increment of 10 ms.

Module Parameters/Reintegration after a discrepancy error

Only in the case of "2oo2 evaluation" of the sensors

Information: "Test 0 signal required at both channels"
A discrepancy error is only removed when there is a 0 signal again at both affected input channels.

See also

Reaction times (Page 9-6)

5.2.7.6 AS-i address table with parameterized AS-i slaves

After the AS-i slaves have been parameterized, the corresponding information is clearly displayed in the AS-i address table.

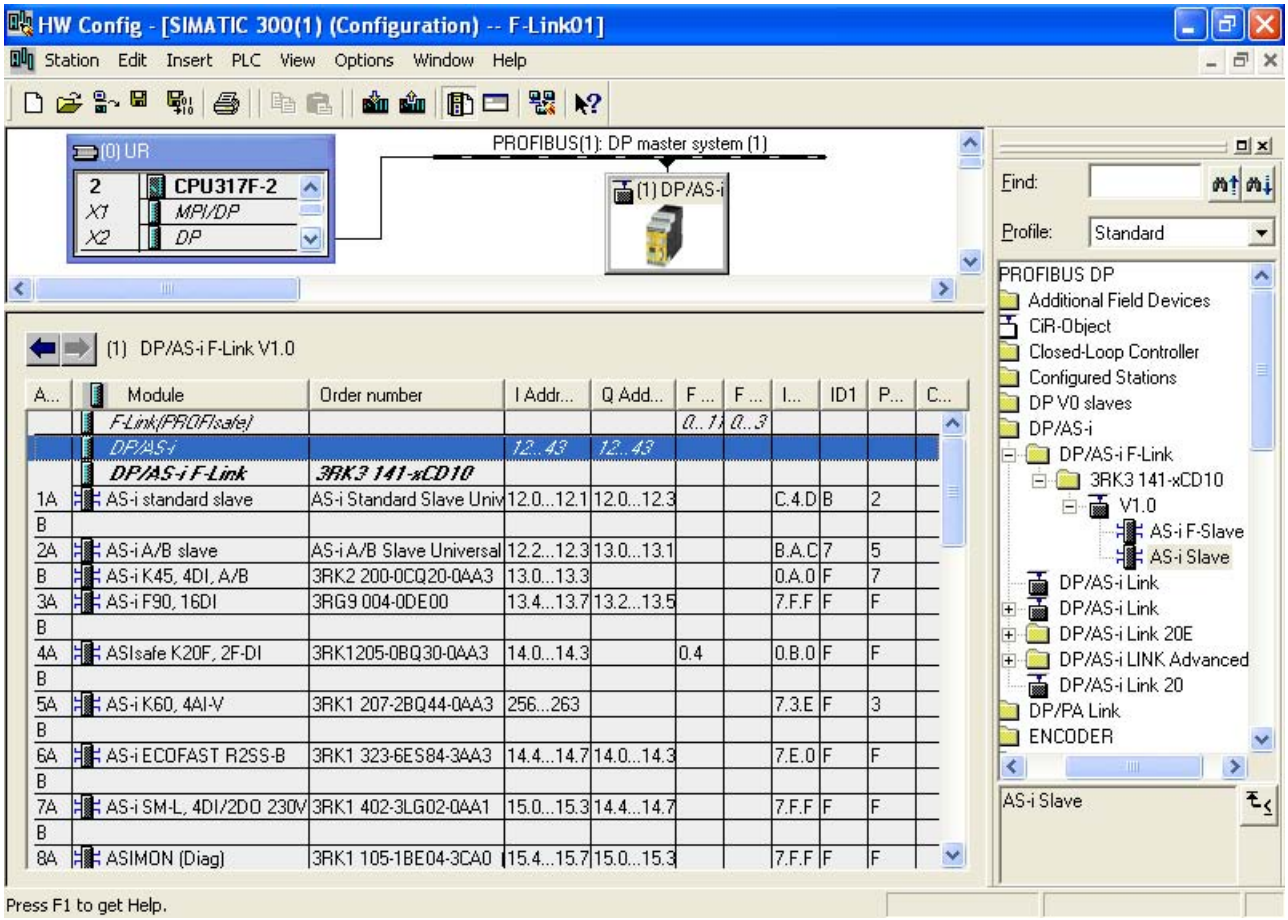


Figure 5-20 AS-i address table with parameterized AS-i slaves

5.2.8 Concluding the configuration in STEP 7

To conclude the project and load it into the CPU, follow the instructions below:

1. Save and compile the configuration in the current project
2. Download the HW configuration to the CPU

Notice

Safety program

After modifying the F parameters, you must re-generate the safety program and download it.

5.2.9 Settings on the DP / AS-i F-Link (OM configuration)

After completing the software configuration with the Object Manager, the folllowing settings must also be made on the DP / AS-i F-Link:

1. Set the configured PROFIsafe address
2. Set the configured PROFIBUS address
3. Address all AS-i slaves
4. Teach the code sequences of the ASIsafe slaves
   - in the OM in the "Properties - DP/AS-i..." dialog box ("AS-i Slaves Options" tab)
   - Direct on the device via the menu entry ASI/CT
5. Switch the device to protected mode

See also

Starting up the DP / AS-i F-Link (Page 6-3)

Settings and operator inputs using the display menu (Page 5-46)

"AS-i Slave Options" tab in the "Properties - DP/AS-i -..." dialog box (Page 5-19)

5.3 Configuration with a GSD file

5.3.1 Information on configuring with a GSD file

Note

Safety parameters

The description of the:

- PROFIsafe parameters (e.g. source address) can be found in the section ""PROFIsafe" tab in the "Properties - DP Slave" dialog box

See also

"PROFIsafe" tab in the "DP slave properties " dialog box (Page 5-8)

5.3.2 Installing the GSD file

Downloading the GSD file

The GSD file for the DP / AS-i F-Link is available free from the Internet address http://support.automation.siemens.com/WW/view/en/24063754 on the "Downloads" tab:

1. Double-click in the list on "PROFIBUS GSD Files: AS-I"
2. Select the station type DP / AS-i F-Link with the relevant GSD file

Installing the GSD file

Install the GSD file, e.g. within STEP 7, as follows:

1. Open "HW Config" in the SIMATIC Manager
2. Select "Options > Install GSD files …"
3. Use the "Search" button to select the path containing the GSD file for the DP / AS-i F-Link
4. Select the file "si01814E.GSE" in the list and confirm with the "Install" button
5. Acknowledge the installation with "Close"

5.3.3 Configuring the DP / AS-i F-Link

5.3.3.1 Configuring the PROFIBUS DP master system

Configuring of the DP / AS-i F-Link with the GSD file in STEP 7 is described below.

Configure the DP / AS-i F-Link as a modular PROFIBUS DP slave in the HW Config of the PROFIBUS DP master.

Procedure

1. Open your STEP 7 project
2. Generate OB 82, OB 85 and OB 86 additionally for the project
3. Open the HW Config of the PROFIBUS DP master
4. Select the DP / AS-i F-Link in the "Hardware Catalog" window.
   Path: PROFIBUS-DP > Other FIELD DEVICES > Gateway > AS-I > DP/AS-i F-Link
5. Drag & drop the selected DP / AS-i F-Link to the DP master system
   The dialog "Properties - PROFIBUS Interface ..." opens
6. Set the properties of the PROFIBUS sub-network
7. Select the PROFIBUS address for the DP / AS-i F-Link
8. Save your settings with "OK"

Results

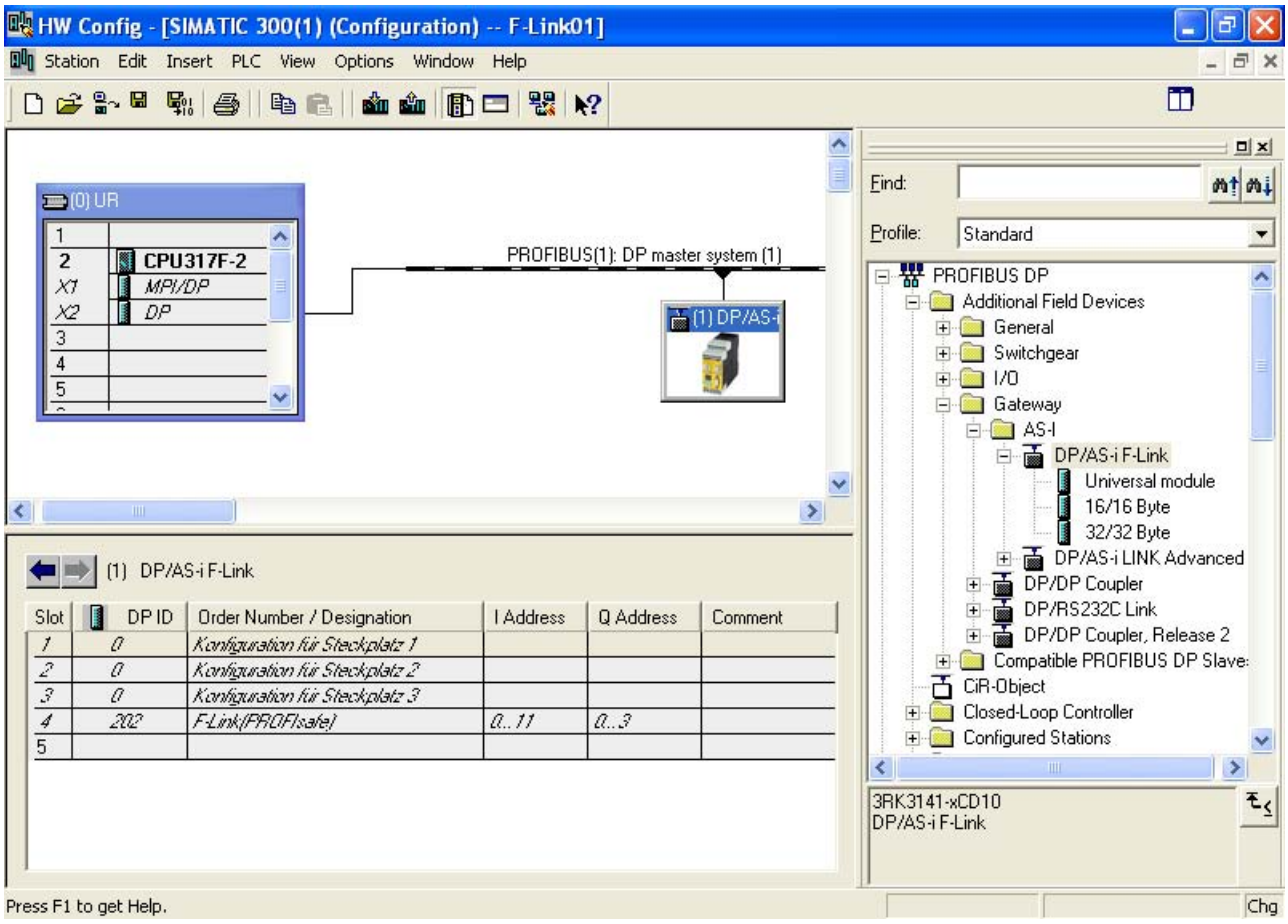


Figure 5-21 Configuration of the DP / AS-i F-Link on the DP master system

A symbol for the DP / AS-i F-Link is appended to the DP master system. In the lower section of the station window, a detailed view of the DP / AS-i F-Link appears with its possible slots or DP IDs.

Slot assignment

Enter the module "16/16 bytes" or "32/32 bytes" in the still free slot "5" in the lower section of the station window.

- With "16/16 bytes", a safety-related full configuration with 31 ASIsafe slaves is possible. B slaves cannot be used.
- With "32/32 bytes", operation of A / B slaves set to B addresses is possible. In this case, the full binary data interface of the DP / AS-i F-Link can be used.

Note

Free slot 5

Slot 5 must be assigned a module (16 / 16 bytes or 32 / 32 bytes) during operation of the DP / AS-i F-Link!

Note

Universal module

You cannot use the universal module!

Double-click on the symbol of the DP / AS-i F-Link on the DP master system to open the "Properties - DP slave" dialog box with its tabs:

- "General"
- "Parameter Assignment"

Make your settings and acknowledge your inputs with "OK" to terminate the dialog.

5.3.3.2 "General" GSD tab

On the "General" GSD tab, set the properties of the DP / AS-i F-Link as a node on PROFIBUS DP.

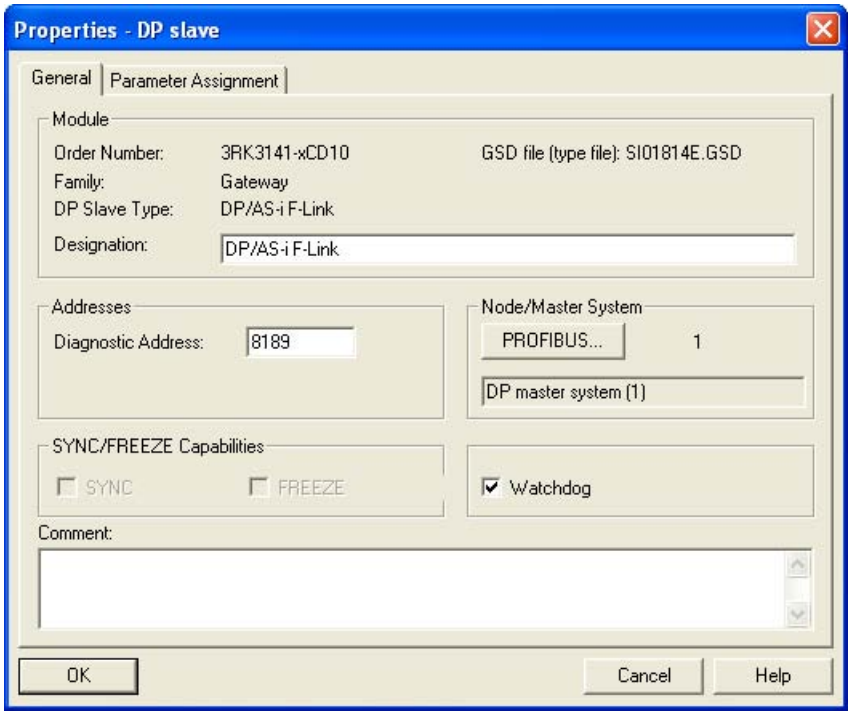


Figure 5-22 "General" GSD tab

For the description of the menu entries, please note the relevant information in the section "Configuring with OM in STEP 7".

See also

Calling the "DP slave properties " dialog box (Page 5-5)

5.3.3.3 "Parameter Assignment" GSD tab

On the "Parameter Assignment" GSD tab, set the properties of the DP / AS-i F-Link as PROFIBUS DP slave and AS-i master.

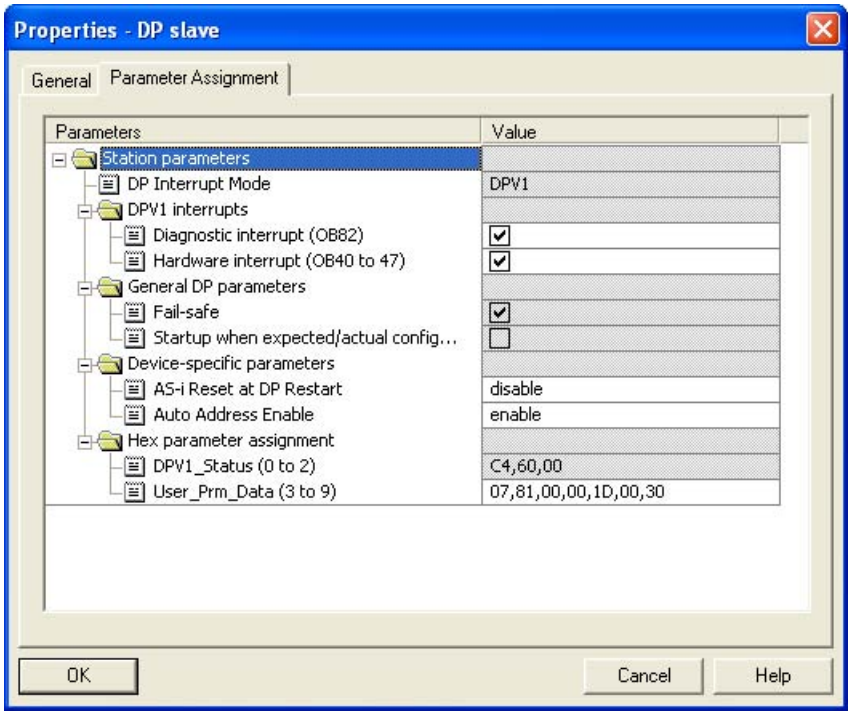


Figure 5-23 "Parameter Assignment" GSD tab

DPV1 interrupts

Activate Alarm enable for **Diagnostic interrupts** (OB82) in the relevant option box Diagnostic interrupts are triggered in the case of the following errors/faults:

- Code sequence error
- Group fault (SF)
- Internal fault (= device fault)
- External fault (e.g. AS-i slave failed)
- At least one AS-i slave deviates from the default
- Voltage on AS-i bus too low (AS-i Power Fail, APF)
- Hardware fault (internal watchdog)
- defective EEPROM

The firmware of the DP / AS-i F-Link does not support or generate **process interrupts** although the parameter is selectable.

Device-specific parameters

If the option "**AS-i Reset at PROFIBUS Restore**" is not activated (default), the DP / AS-i F-Link checks what differences exist between the data in the parameterization and configuration frame and the actual data after PROFIBUS has been restored. The comparison is the basis for the following responses:

- If identical, the DP / AS-i F-Link carries out a reset of the AS-Interface
- If parameter bits of the AS-i slaves are not identical, only these are updated
- More extensive deviation results in a reset of the AS-Interface

If the option "AS-i Reset at PROFIBUS Restore" is activated, a PROFIBUS restart always results in reset of the AS-Interface. Arrival of frames for parameterization and configuration data from the PROFIBUS DP master causes AS-i frame traffic to be completely stopped and restarted.

If the option **"Automatic AS-i addressing"** is activated (default), replacement of a failed AS-i slave by a new, identical slave (same IO, ID, ID1, ID2 code) with the address "0" (factory status) is possible. The DP / AS-i F-Link automatically assigns the address of the predecessor to the new AS-i slave.

Hex parameter assignment

Notice

Inadvertant changes

Make changes to the parameterization frame only using the parameters described above.

See also

Replacing an AS-i slave/automatic address programming (Page 8-14)

5.3.4 Configuring safe AS-i slaves (F_Link_PROFIsafe)

Open the Properties dialog for slot 4 as follows:

- Double-click on line 4 of the configuration table with the name "F_Link_PROFIsafe"
- Select the context menu "Object Properties...".

A dialog box with the following tabs appears:

- "Address / ID":
- "Parameter Assignment"
- "PROFIsafe"

Make your settings and acknowledge your inputs with "OK" to terminate the dialog.

5.3.4.1 "Address / ID" GSD tab

You define the I/O addresses of the safe data of the ASIsafe slaves for slot 4 on the "Address / ID" tab.

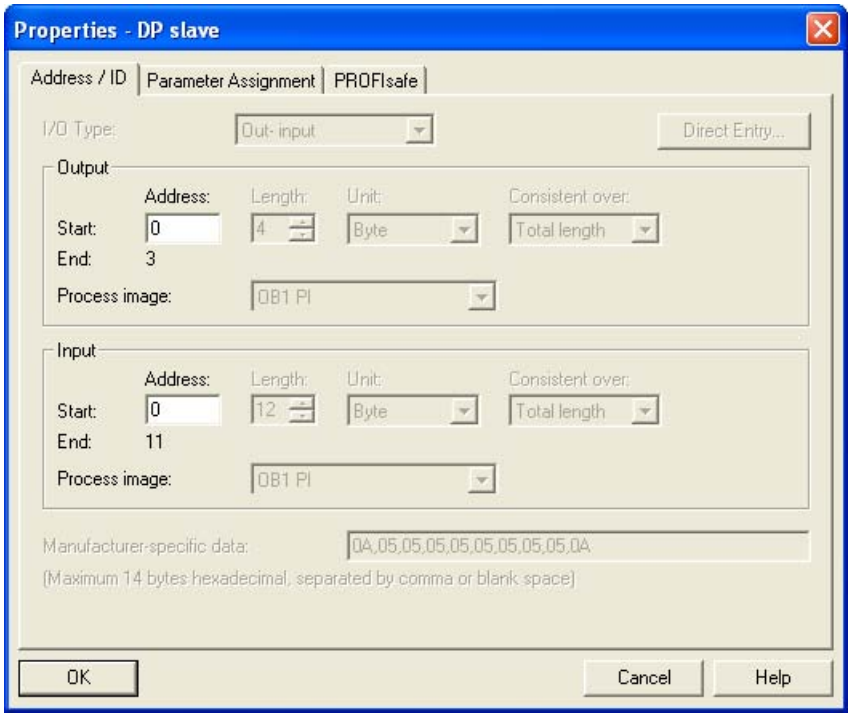


Figure 5-24 "Address / ID" GSD tab for slot 4

Addresses

The "Start" line contains the starting addresses of the safe I/O data. You can either accept the system suggestion or modify the starting addresses. You are informed of address overlaps and you receive the a new address suggestion.

Note

Identical starting addresses

Please note that the starting addresses for safe inputs and outputs must be identical.

5.3.4.2 "Parameter Assignment" GSD tab

Changes cannot be made on the "Parameter Assignment" tab.

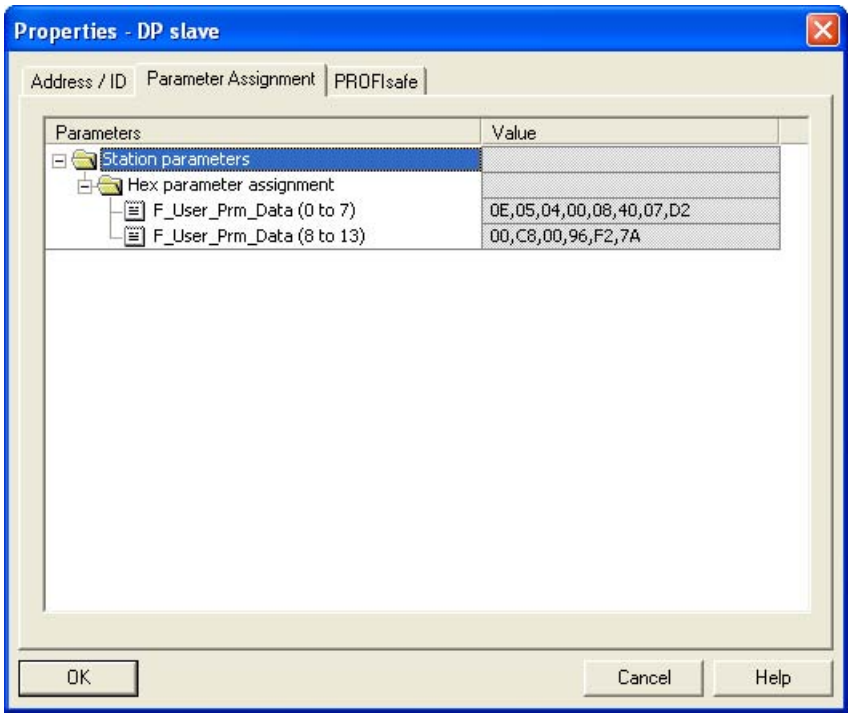


Figure 5-25 "Parameter Assignment" GSD tab for slot 4

Settings of the specified parameters

You can operate up to 31 ASIsafe slaves on the DP / AS-i F-Link. When configuring using the GSD file, the function range for safety-related evaluation is fixed.
The following applies for all ASIsafe slaves:

- Input delay: 0 ms

By placing the ASIsafe slave in a specific address range, you decide about the evaluation of the following input signals:

- AS-i addresses 1 ... 16
  - Evaluation of the Sensors: 1oo1 evaluation
- AS-i addresses 17 ... 31
  - Evaluation of the Sensors: 2oo2 evaluation
  - Type of sensor interconnection: 2-channel equivalent
  - Discrepancy time: 2500 ms
  - No discrepancy error suppression
  - Reintegration after discrepancy error: Test 0 signal required on both channels

See also

"ASIsafe" tab in the "Properties - AS-i F-Slave..." dialog box (Page 5-30)

5.3.4.3 "PROFIsafe" GSD tab

The "PROFIsafe" tab contains the safety-related settings of the DP / AS-i F-Link for the PROFIsafe protocol.

For filling in the menu entries and scanning the password for the safety program, please note the relevant information in the section "Configuring with OM in STEP 7".

See also

"PROFIsafe" tab in the "DP slave properties " dialog box (Page 5-8)

5.3.5 Configuring binary AS-i slaves (slot 5)

Open the Properties dialog for slot 5:

- Double-click on line 5
- Select the context menu "Object Properties...".

The Properties dialog box with the following tabs appears:

- "Address / ID":
- "Parameter Assignment"

Make your settings and acknowledge your inputs with "OK" to terminate the dialog.

5.3.5.1 "Address / ID" GSD tab

You define the I/O addresses of the binary data of the ASIsafe slaves for slot 5 on the "Address / ID" tab.

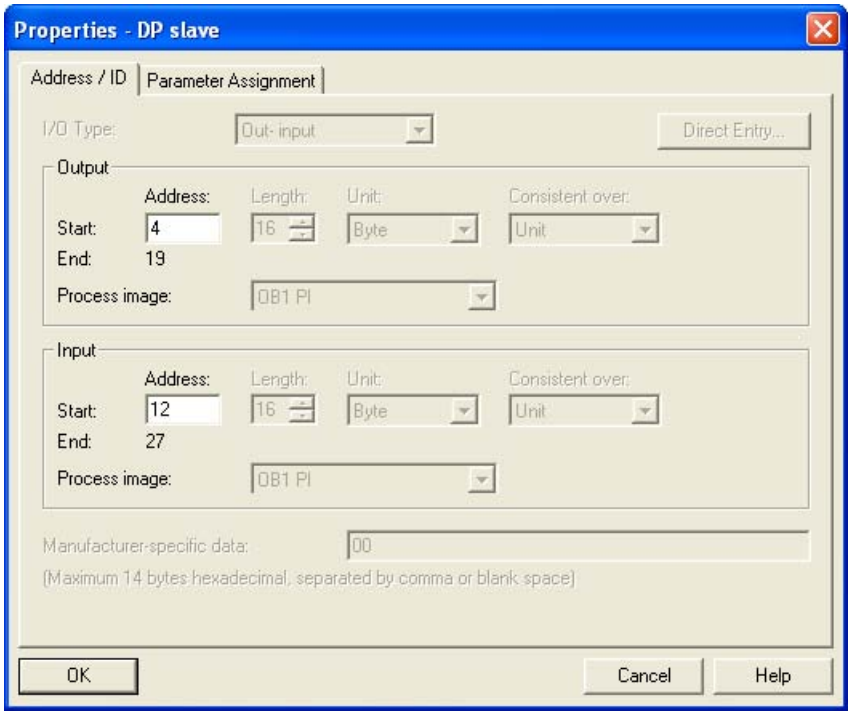


Figure 5-26 "Address / ID" GSD tab for slot 5

Addresses

The **"Start"** line contains the starting addresses of the binary I/O data. You can either accept the system suggestion or modify the starting addresses. You are informed of address overlaps and you receive the a new address suggestion.

Note

"CLASSIC" sorting of the I/O data in the PROFIBUS DP master

When configuring using the GSD file, the I/O data of the AS-i slaves are arranged using the CLASSIC sorting method. Please note here the section "Arrangement in the I/O address space" in the description of the "Digital Addresses" tab for OM configuring.

The way you access the binary data of the AS-i slaves depends on the PROFIBUS DP master you use. Refer to the relevant user documentation here.

See also

"Digital Addresses" tab in the "Properties - DP/AS-i -..." dialog box (Page 5-12)

5.3.5.2 "Parameter Assignment" GSD tab

You set the device-specific parameters of the AS-i slaves in the "Parameter Assignment" tab.

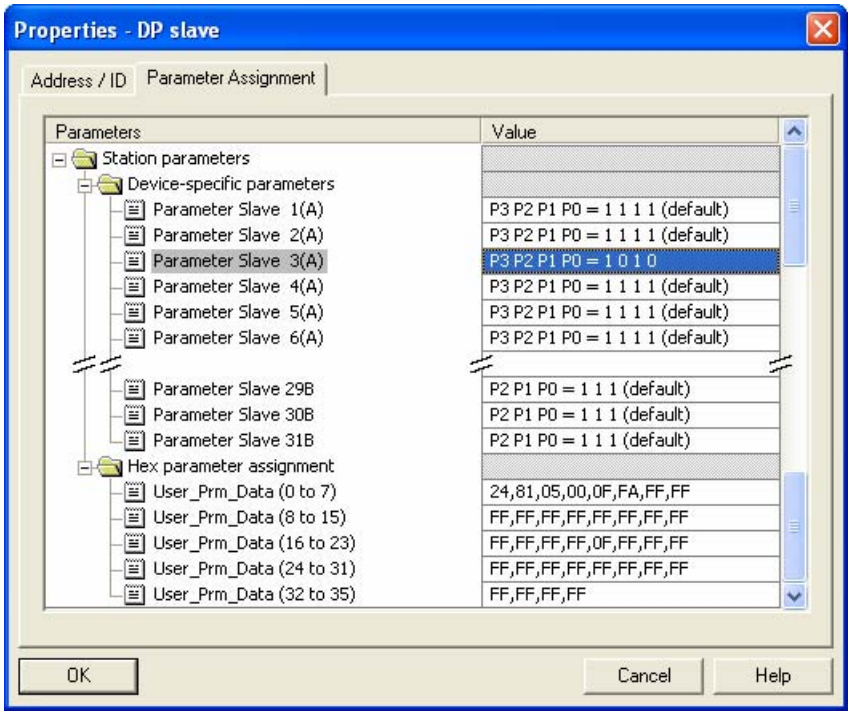


Figure 5-27 "Parameter Assignment" GSD tab for slot 5

Device-specific parameters

In the "Device-specific parameters" folder, select the bit combinations of the parameters of the AS-i slaves via the drop-down lists.
You can find explanations of the individual parameters in the manuals of the AS-i slaves.

Hex parameter assignment

In the folder "Hex parameter assignment", the data for the parameter frame are specified in hexadecimal format. Knowledge of the structure of the parameter assignment frame is required for entering the data. Please note IEC 61158 in this regard.

5.3.6 Concluding the configuration in STEP 7

To conclude the project and load it into the CPU, follow the instructions below:

1. Save and compile the configuration in the current project
2. Download the HW configuration to the CPU

Notice

Safety program

After modifying the F parameters, you must re-generate the safety program and download it.

5.3.7 Settings on the DP / AS-i F-Link (GSD configuration)

After completing the software configuration with the GSD file, the folllowing settings must also be made on the DP / AS-i F-Link:

1. Set the configured PROFIsafe address
2. Set the configured PROFIBUS address
3. Address all AS-i slaves,
   if necessary, via a separate addressing device (MLFB: 3RK1 904-2AB01)
4. Teach the code sequences of the ASIsafe slaves
5. Switch the device to protected mode

See also

Starting up the DP / AS-i F-Link (Page 6-3)

Settings and operator inputs using the display menu (Page 5-46)

5.4 Settings and operator inputs on the device

You can make various settings direct on the DP / AS-i F-Link and call up status messages using the keyboard and display:

- Change to AS-i mode/pushbutton configuring
- Listing of status messages of the AS-i slaves
- Addressing/re-addressing AS-i slaves
- Teaching the code sequences of the ASIsafe slaves
- Setting/modifying the PROFIBUS address
- Setting/modifying the PROFIBUS address
- Restoring the factory settings

5.4.1 Settings and operator inputs using the display menu

Switch the display from status mode to menu mode:

- Press the "SET" key

Table 5-7 Settings and operator inputs using the display menu

Menu entry	Meaning/execution	
MODE▫	Changing the operating mode of the DP / AS-i F-Link / Saving the pending configuration This menu entry is available: • When configuring with GSD file • When configuring with OM if no AS-i slaves are configured Confirm "MODE▫". The current status appears in the 2nd line:	
	• "PROT▫": DP / AS-i F-Link in protected mode	
	1.	Confirm "PROT▫" and the menu entry "→CFG▫" appears.
	2.	Confirm again to switch the DP / AS-i F-Link to the "Configuration" mode. The display then changes to status mode.
	• "CFG▫▫": DP / AS-i F-Link in "Configuration" mode	
	1.	Confirm "CFG▫▫".
	2.	Select the following menu entries in the submenu:
	-	"PSET▫": Saving of the pending configuration (LDS becomes LPS); the DP / AS-i F-Link changes to protected mode.
	-	"PMOD▫": No saving of the pending configuration; the DP / AS-i F-Link changes to protected mode.
LIST▫	Listing of the AS-i addresses with status display For an explanation of this menu entry, please note the section "Listing of errors via the display menu in menu mode" in the chapter "Service/diagnostics/remedies".	
ASI▫▫	Changing the AS-i address of a module / teaching code sequences Confirm "ASI▫▫". Select from the following submenus:	
	• "ADR▫▫": Changing the AS-i address of a module	
	1.	Confirm "ADR▫▫" with "SET".

Menu entry	Meaning/execution
	2. In the subsequent submenu, select the existing AS-i address with the "MODE" key. A new AS-i slave has the address "0" (sequential order 0, 1, 1A, 1B, 2, 2A, 2B, ..., 31, 31A, 31B, EXIT, 0 ...). The B addresses are only displayed if A / B slaves are connected to the AS-Interface.
	3. Confirm with "SET". Your selection appears in the first line and "NEW▫▫" appears in the second line.
	4. Confirm with "SET".
	5. In the subsequent submenu, select the new AS-i address with the "MODE" key.
	6. Confirm with "SET". The new AS-i address is checked with the following results:
	- If the address is accepted successfully, "OK▫▫▫" appears in the second line.
	- If the address is not accepted successfully, "ERR▫▫" appears in the second line.
	7. Confirm with "SET". The display changes to status mode.
	• "CT▫▫▫": Teaching code sequences (all input contacts of the ASIsafe slaves must be closed)
	1. Confirm teaching of the code sequences of all ASIsafe slaves with "SET". The second line contains "c" on the left and, right-justified, the next higher AS-i address of the slave whose code sequence is being taught. "▫OK▫▫" appears following successful Teaching.
	2. Confirm with "SET". The display changes to status mode.
DP▫▫▫	Changing the PROFIBUS DP address
	1. Confirm "DP▫▫▫" and "ADR▫▫" by pressing the "SET" key. The current PROFIBUS DP address appears in the second line.
	2. Select the digits of the hundreds position of the new PROFIBUS DP address with the "MODE" key and confirm with "SET" (sequential order 0, 1, 0, ...).
	3. Select the digits of the tens position with the "MODE" key and confirm with "SET" (sequential order 0, 1, 2, ...).
	4. Select the digits of the units position with the "MODE" key and confirm with "SET" (sequential order 0, 1, 2, ... 9,0, ...). Your entry apears in the first line. The message "OK▫▫▫" appears in the second line.
	5. Confirm with "SET" or "MODE". The display changes to status mode.
F-DP▫	Changing the PROFIsafe address
	1. Confirm "F-DP▫" and "ADR▫▫". The current PROFIsafe address appears in the second line.
	2. Select the digits of the thousands position of the new PROFIsafe address with the "MODE" key and confirm with "SET" (sequential order 0, 1, 2, ...).
	3. Select the digits of the hundreds position with the "MODE" key and confirm with "SET".
	4. Select the digits of the tens position with the "MODE" key and confirm with "SET".
	5. Select the digits of the units position with the "MODE" key and confirm with "SET". Your entry apears in the first line. The message "F-OK▫" appears in the second line.
	6. Confirm with "SET" or "MODE". The display changes to status mode.
EXIT▫	Change to status mode You can choose from the following methods for doing this: • Press "SET". The display changes to status mode. • The menu entry "EXIT" is also found in the submenus. You can jump direct to "EXIT" by simultaneously pressing "SET" + "MODE". • If no key is pressed for 30 s, the system automatically changes to status mode.

Note

Navigation in the display menu

For navigation in the display menu, please note the section "Display" in the chapter "Description".

See also

"AS-i Slave Options" tab in the "Properties - DP/AS-i -..." dialog box (Page 5-19)

Listing faults via the display menu in menu mode (Page 8-9)

5.4.2 Changing from protected mode to configuration mode

The menu entry "MODE▫" of the DP / AS-i F-Link can only be selected in the case of configuring with the GSD file. When configuring using the Object Manager, menu selection is only possible under certain conditions (PROFIBUS connector removed, AS-i address table unassigned in the OM).

In protected mode, the DP / AS-i F-Link only exchanges data with the configured AS-i slaves. "Configured" means the slave addresses and configuration data stored in the DP / AS-i F-Link agree with the values of existing AS-i slaves. The display and the LEDs indicate errors and diagnostics data during operation.

Procedure

Execute the actions described below to change from protected mode to "Config" mode:

1. Press the "SET" key
   The display changes from status mode to menu mode
2. Select the menu entry "MODE▫" with the "MODE" key
   "PROT▫" appears in the first line for the current mode
3. Confirm by pressing the "SET" key.
4. Select the desired menu entry with the "MODE" key:
   - "→CFG▫": Change to Config mode.
   - "EXIT▫" Return to the main menu
5. Confirm your selection with the "SET" key
   The display changes back to status mode

5.4.3 Changing from config mode to protected mode

Config mode and the menu entry "MODE▫" of the DP / AS-i F-Link can only be selected in the case of configuring with the GSD file. Otherwise configuring using the Object Manager is specified and menu selection is only possible under certain conditions (PROFIBUS connector removed, AS-i address table unassigned in the OM).

In "Config" mode, the DP / AS-i F-Link exchanges data with every connected AS-i slave. Newly added AS-i slaves are immediately detected, activated and included in cyclic data exchange by the DP / AS-i F-Link. Exceptions to this if an AS-i slave has the address "0" or an AS-i address is assigned more than once. The DP / AS-i F-Link saves the following data of the AS-i slaves to non-volatile memory:

- Addresses
- ID codes
- I/O configuration

Saving of the detected pending configuration is mandatory for startup after GSD configuring (configuring at the press of a button).
The detected pending configuration is also available after OM configuring using the command "Upload to PG" ("Properties - DP/AS-i -..." dialog).

Procedure

Execute the actions described below to change from "Config" mode to protected mode:

1. Press the "SET" key
   The display changes from status mode to menu mode
2. Select the menu entry "MODE▫" with the "MODE" key:
3. Confirm by pressing the "SET" key
   "CFG▫▫" appears in the second line for the current operating mode
4. Confirm by pressing the "SET" key.
5. Select the desired menu entry with the "MODE" key:
   - "PSET▫": Change to protected mode and saving of the pending configuration (LDS becomes LPS)
   - "PMOD▫": Change to protected mode, no saving of the pending configuration
   - "EXIT▫" Return to the main menu
6. Confirm your selection with the "SET" key
   The display changes back to status mode

5.4.4 Listing AS-i addresses with status display

For an explanation of this menu entry, please note the section "Listing of errors via the display menu in menu mode" in the chapter "Service/diagnostics/remedies".

See also

Listing faults via the display menu in menu mode (Page 8-9)

5.4.5 Modifying the AS-i address of a module

Execute the actions described below to set or modify the AS-i address of a module:

1. Press the "SET" key
   The display changes from status mode to menu mode
2. Select the menu entry "ASI▫▫" with the "MODE" key:
3. Confirm "ASI▫▫" by pressing the "SET" key.
4. Confirm "ADR▫▫" by pressing the "SET" key
   "OLD▫" appears in the first line
5. In the second line, select the existing AS-i address with the "MODE" key. A new AS-i slave has the address "0" (sequential order 0, 1, 1A, 1B, 2, 2A, 2B, ..., 31, 31A, 31B, EXIT, 0 ...). The B addresses are only displayed if A / B slaves are connected to the AS-Interface
6. Confirm with "SET"
   Your selection appears in the first line and "NEW▫▫" appears in the second line.
7. Confirm with "SET"
8. In the second line, select the new AS-i address with the "MODE" key (sequential order 0, 1, 1A, 1B, 2, 2A, 2B, ..., 31, 31A, 31B, EXIT, 0 ...). The B addresses are only displayed if A / B slaves are connected to the AS-Interface
9. Confirm with "SET"
   The new AS-i address is checked with the following results:
   - If the address is accepted successfully, "OK▫▫▫" appears in the second line
   - If the address is not accepted successfully, "ERR▫▫" appears in the second line
     Check the addresses you have entered and start address setting again
10. Confirm with "SET"
    The display changes back to status mode

5.4.6 Teaching the code sequences of the ASIsafe slaves

To teach the code sequences of the ASIsafe slaves, execute the actions described below:

1. Close the input contacts of all ASIsafe slaves
2. Press the "SET" key
   The display changes from status mode to menu mode
3. Select the menu entry "ASI▫▫" with the "MODE" key:
4. Confirm "ASI▫▫" by pressing the "SET" key.
5. Select the menu entry "CT▫▫▫" with the "MODE" key:
6. Confirm "CT▫▫▫" with the "SET" key.
   The second line contains "c" on the left and, right-justified, the next higher AS-i address of the slave whose code sequence is being taught.
7. When Teaching stops, check and close the input contacts of the displayed ASIsafe slave.
   Teaching continues
   "▫OK▫▫" appears following successful Teaching.
8. Confirm with "SET"
   The display changes back to status mode.

Note

Safety mode possible again

As soon as teaching has been successfully completed and the message "CT▫▫▫ / ▫OK▫▫" appears on the display, the DP /AS-i F-Link can be re-integrated and it can change to "Safety mode".

5.4.7 Changing the PROFIBUS Address

Execute the actions described below to set or modify the PROFIBUS address:

1. Press the "SET" key
   The display changes from status mode to menu mode
2. Select the menu entry "DP▫▫▫" with the "MODE" key:
3. Confirm "DP▫▫▫" by pressing the "SET" key.
4. Confirm "ADR▫▫" by pressing the "SET" key
   The current PROFIBUS address appears in the second line
5. Select the digits of the hundreds position of the new PROFIBUS address with the "MODE" key and confirm with "SET" (sequential order 0, 1, 0, ...).
6. Select the digits of the tens position with the "MODE" key and confirm with "SET" (sequential order 0, 1, 2, ...).
7. Select the digits of the units position with the "MODE" key and confirm with "SET" (sequential order 0, 1, 2, ... 9, 0, ...).
   Your entry apears in the first line. The message "OK▫▫▫" appears in the second line

8. Accept the new PROFIBUS address with the "SET" key
9. If you use a DP / AS-i F-Link that no longer has the factory settings, switch the power supply off and on again for final acceptance of the PROFIBUS address
   The display changes back to status mode.

5.4.8 Changing the PROFIsafe address

Execute the actions described below to set or modify the PROFIsafe address:

1. Press the "SET" key
   The display changes from status mode to menu mode
2. Select the menu entry "F-DP▫" with the "MODE" key:
3. Confirm "F-DP▫" by pressing the "SET" key.
4. Confirm "ADR▫▫" by pressing the "SET" key
   The current PROFIsafe address appears in the second line
5. Select the digits of the thousands position of the new PROFIsafe address with the "MODE" key and confirm with "SET" (sequential order 0, 1, 2, ...
6. Select the digits of the hundreds position with the "MODE" key and confirm with "SET"
7. Select the digits of the tens position with the "MODE" key and confirm with "SET"
8. Select the digits of the units position with the "MODE" key and confirm with "SET"
   Your entry apears in the first line. The message "F-OK▫" appears in the second line
9. Accept the new PROFIsafe address with the "SET" or "MODE" key
   The display changes back to status mode

5.4.9 Restoring the factory settings

You can restore the factory settings of the DP / AS-i F-Link, for the purpose of, say, re-installing an already used device. To do this, execute the actions described below during the power-up phase of the DP / AS-i F-Link:

1. Switch the 24 V DC power supply off
2. Hold down the "RESET" key
3. Switch the 24 V DC power supply on again
4. Release the "RESET" key only when the DEVICE LED flickers yellow
5. Keep holding down the "RESET" key if the DEVICE LED flickers red
6. Release the "RESET" key when the DEVICE LED flickers yellow
7. Keep holding down the "RESET" key if the DEVICE LED flickers red
8. When the DEVICE LED goes out, release the "RESET" key within 10 s
   The DEVICE LED starts to flash yellow
9. Switch the 24 V DC power supply off
10. Switch the 24 V DC power supply on again

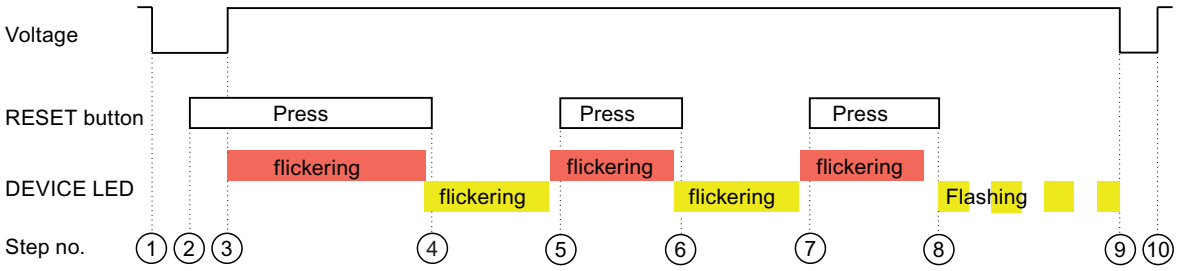


Figure 5-28 Restoring the factory settings

Notice

The sequence shown in the diagram must be followed!

If the sequence is not followed, (key not pressed long enough, or pressed too long, or released too soon or too late), the factory setting process aborts and the DEVICE LED changes to green.
The device starts up normally.

The factory setting procedure has the following effects on the DP / AS-i F-Link:

- All configuration information is deleted
- All taught code sequences are deleted
- The PROFIBUS address is set to 126
- The PROFIsafe address is set to 0

Startup

6

This chapter provides information on the following:

- Requirements for startup
- Startup sequence of the DP / AS-i F-Link

6.1 Requirements for startup

The following requirements must be met for startup of the DP / AS-i F-Link:

- Failsafe CPU with PROFIBUS DP master installed and wired.

  Please note the relevant manual of the PROFIBUS DP master.

- Configuring with STEP 7 or another engineering tool is completed and transferred to the PROFIBUS DP master.

  Please note the "Configuration" chapter.

- DP / AS-i F-Link is installed and wired.

  Please note the "Installing/connecting" chapter.

- PELV power section for the DP / AS-i F-Link connected.

  Please note the relevant operating instructions for the power section.

- AS-i segment and AS-i power section wired

Note

Using the factory settings

A DP / AS-i F-Link that has already been used once must be returned to the factory status with the factory settings. Please note that in doing so, the saved data and code sequences are deleted!

6.2 Starting up the DP / AS-i F-Link

Warning

Since the startup of the DP / AS-i F-Link is an important safety-related working step, it must be carried out by the responsible safety coordinator for the application.

You must ensure the following before final operation is started:

- System test
- Function test of the safety-related AS-i slaves
- Logging of the safety settings
- Acceptance of the system
- When configuring with OM, please also refer to the document
  "Handlilng safety-related parameters in the case of the DP / AS-i F-Link"
  The document is available on the Internet from
  http://support.automation.siemens.com/WW/view/en/24063754 on the "Downloads" tab:

Please refer to the following manuals for startup:

- S7 Distributed Safety - Configuration and Programming
- Safety Engineering in SIMATIC S7

Or the specifications of other corresponding engineering tools as well as the documentation of the failsafe CPUs and AS-i slaves used.

Carry out the following steps to start up the DP / AS-i F-Link:

Table 6-1 Starting up the DP / AS-i F-Link

Step		Execution/response
1	Switch on the voltage for the 30 V AS-i power section.	
2	Switch on the power supply for the DP / AS-i F-Link. At restart, the device carries out a self-test. All LEDs light up for 3 s. The two-color LEDs light up yellow. At initial startup, the first line of the display shows "F-DP" and the second line shows "ADR▫▫".	
The DP / AS-i F-Link is in "Config" mode		
3	Set the PROFIsafe address on the DP / AS-i F-Link.	
	1.	Confirm the display "F-DP" / "ADR▫▫" with "SET". The display shows the existing PROFIsafe address in the second line.
	2.	Set the new PROFIsafe address using the number lock (selection with "MODE", advance with "SET"). Use the same PROFIsafe address as in the configuration (F_Dest_Add).
	3.	Confirm with "SET". The first line shows your input. The message "F-OK▫" appears in the second line.
	4.	Confirm with "SET". At initial startup, the first line of the display shows "DP▫▫" and the second line shows "ADR▫▫".
4	Set the PROFIBUS address on the DP / AS-i F-Link.	
	1.	Confirm the display "DP▫▫" / "ADR▫▫" with "SET". The display shows the existing PROFIBUS address in the second line.
	2.	Set the new PROFIBUS address using the number lock (selection with "MODE", advance with "SET"). Use the same PROFIBUS address as in the configuration.
	3.	Confirm with "SET". The first line shows "DP" and your input. The message "OK▫▫▫" appears in the second line.
	4.	Confirm with "SET" The display changes to status mode.
5	Address the AS-i slaves. If AS-i slaves with the address "0" are still connected after configuring, there are two methods for addressing: • Addressing device, MLFB 3RK1 904-2AB01 • DP / AS-i F-Link If you use the DP / AS-i F-Link for addressing, you can only address the AS-i slaves consecutively:	
	1.	Switch to menu mode of the display with the "SET" key.
	2.	Select the menu entry "ASI▫" with the "MODE" key:
	3.	Confirm twice with "SET".
	4.	Connect an AS-i slave to the AS-Interface. Please note the relevant operating instructions.
	5.	In the subsequent menu, select the existing AS-i address with the "MODE" key (a new AS-i slave has the address "0").
	6.	Confirm with "SET". Your selection appears in the first line and "NEW▫" appears in the second line.
	7.	Confirm with "SET".
	8.	In the subsequent submenu, select the new AS-i address with the "MODE" key.
	9.	Confirm with "SET". If the address is accepted successfully, "OK▫▫▫" appears in the second line.
	10.	Confirm with "SET". The display changes to status mode.
	11.	To address another AS-i slave, repeat the steps 1 ... 10.

Step	Execution/response	
6	Accept the new PROFIBUS address into the DP / AS-i F-Link: • A new device accepts the new PROFIBUS address immediately. • If you are not starting up a new DP / AS-i F-Link, switch the power supply off and on again. An already used DP / AS-i F-Link accepts the modified PROFIBUS address only after the power supply has been switched on again.	
7	Change the DP / AS-i F-Link to protected mode.	
	• When configuring with OM	
	1.	Switch the CPU on. The DP / AS-i F-Link receives its startup data records from the CPU.
	• When configuring with GSD file	
	1.	Switch to menu mode of the display with the "SET" key.
	2.	Confirm the menu entry "MODE" twice with "SET".
	3.	Select the menu entry "PSET" in the second line with the "MODE" key.
	4.	Save the pending configuration. Confirm "PSET" with "SET".
	The display changes to status mode and shows "RUN▫". The DEVICE LED remains green, the ASi LED changes from yellow to green. The BF-LED and SF-LED remain switched off. In contrast to the behavior described above, the display changes from "RUN▫" to "ASI▫" / "CT▫▫▫" at initial startup. The DEVICE LED flashes green.	
The DP / AS-i F-Link is now in protected mode		
8	Start Teaching of the code sequences of all ASIsafe slaves. When starting up a new DP / AS-i F-Link, the second line of the display shows "CT▫▫▫". For Teaching of the code sequences, close all input contacts of the ASIsafe slaves.	
	• Teaching via Object Manager in STEP 7 Please note the information in the OM dialog "Teaching code tables".	
	1.	Click on the "Teach" button on the "AS-i Slave Options" tab in the "Properties - DP/AS-i -..." dialog box
	2.	Start Teaching of the code sequences of the ASIsafe slaves.
	3.	After completing Teaching, acknowledge the dialog with the "Teaching completed" button.
	• Teaching via the operator menu on the DP / AS-i F-Link (possible for GSD and OM configuring)	
	1.	Confirm the display "ASI▫" / "CT▫▫▫" with "SET". Teaching begins. On the device display, "c" appears on the left of the second line and the next higher AS-i address of the slave whose code sequence is being taught is displayed right-justified. The display shows addresses of slaves with opened input contacts. Teaching continues when the relevant contacts have been closed.
	2.	After completion of Teaching, acknoweldge the display "▫OK▫▫" with "SET". The display changes to status mode.
	The display changes to status mode and shows "RUN▫". The DEVICE LED changes from flashing green to green, and the ASi LED changes from yellow to green. The BF LED and SF LED remain switched off.	
Safety mode is now possible with the DP / AS-i F-Link.		

Command interface

7

This chapter provides you with information on how to

- Access the command interface of the DP / AS-i F-Link from the PROFIBUS DP master
- Use the command interface to control the AS-i master behavior of the DP / AS-i F-Link via your user program

There is an explanation of the two interfaces as well as a detailed description of the AS-i commands:

- Command interface of the DP / AS-i F-Link
- Command interface of a SIMATIC S7 as PROFIBUS DP master

7.1 Command interface of the DP / AS-i F-Link

7.1.1 Functional principle of the command interface of the DP / AS-i F-Link

You can use the command interface to control the AS-i master behavior of the DP / AS-i F-Link entirely via your user program

Note

Special function (FC ASI_3422) when using a SIMATIC S7 as PROFIBUS DP master

When using a SIMATIC S7 as PROFIBUS DP master, a special function (FC ASI_3422) is available for using the AS-i command. This function autonomously processes the command protocol described below. Please note the section "Command interface in SIMATIC S7".

AS-i commands are read and written via the acyclic services of PROFIBUS DP-V1. Use the services Read_data_record and Write_data_record in the user program of the PROFIBUS DP master (data record 2). You can Teach the current status of command processing by scanning the status nibble. The figure below shows the flow of information between the PROFIBUS DP master and the DP / AS-i F-Link:

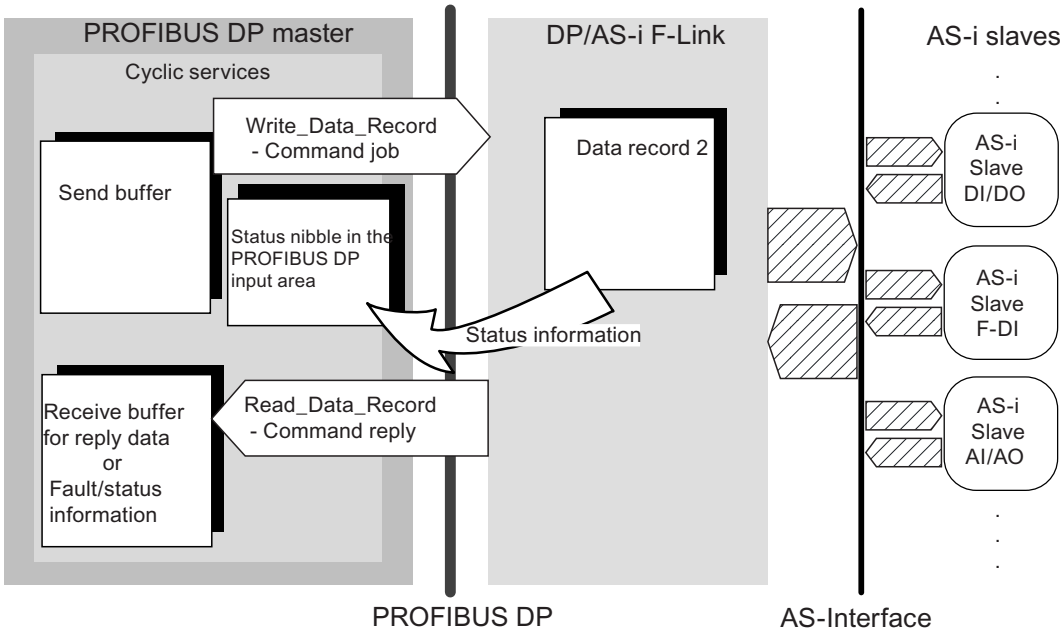


Figure 7-1 Communication principle of the command interface

7.1.2 Job parameters for the command interface of the DP / AS-i F-Link

Parameterize the jobs Read_data_record and Write _data_record as described in the sections "Calling the acyclic DP services/data records" and "Call parameters for sending/receiving".

Transmission of the command is controlled via the following parameters:

- Index:
  determines data record number = 2
- Length:
  - The length of the send data (in the case of Write_data_record) has to be specified dependent on the command
  - The length of the receive data (in the case of Read_data_record) is signaled by the DP / AS-i F-Link via the status nibble

7.1.3 Command processing in the user program

Structure command processing in the user program as follows:

Table 7-1 Command processing in the user program

Step	Action	You will find additional information in the section:
1	Specify the command call in a send buffer within the user program	• "Overview of the AS-i command"
2	Send this job to the DP / AS-i F-Link with Write_data_record (data record 2)	• "Calling the acyclic PROFIBUS DP services/data records" • "Call parameters for sending/receiving" • "Job parameters for the command interface of the DP / AS-i F-Link"
3	In the PROFIBUS DP input area, scan the status of command processing for binary values. The status information is stored in the status nibble.	• "Coding of the status nibble"
4	Follow the flowchart in accordance with the result of the staus nibble scan	• "Sequential flow following status nibble scan"
5	To finish issuing the command, you must transmit a job with Read_data_record (data record 2) either to obtain further status information or to accept the reply data	• "Calling the acyclic PROFIBUS DP services/data records" • "Call parameters for sending/receiving" • "Job parameters for the command interface of the DP / AS-i F-Link"

7.1.4 Sequential flow following status nibble scan

The flowchart below shows the procedure following a status nibble scan depending on the reply of the DP / AS-i F-Link:

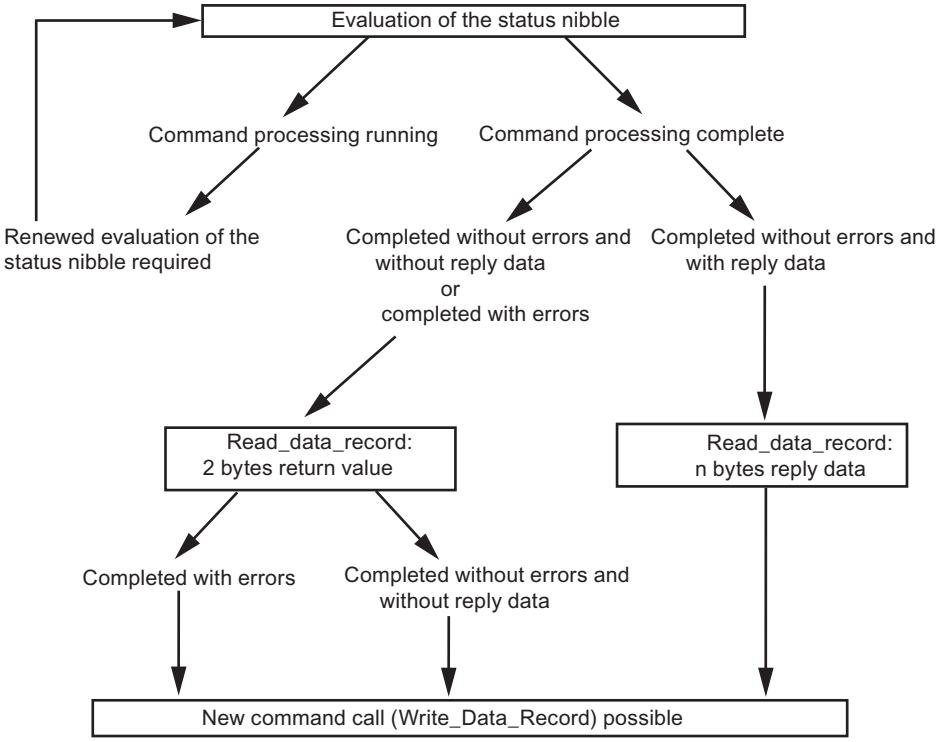


Figure 7-2 Sequential flow following status nibble scan

7.1.5 Coding of the status nibble

The table below shows what the status nibble indicates in the reply of the DP / AS-i F-Link. The status nibble is in the 1st byte (bit 4-7) of the PROFIBUS DP input area.

Table 7-2 Coding of the status nibble

Status nibble				Meaning	
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**		
1	0	0	0	Start identifier 1	After a startup/warm restart of the AS-i master, the status nibble changes between the two start identifiers with the values 1000_B and 1110_B. Command initiation via the user program is possible.
1	1	1	0	Start identifier 2	
1	1	0	0	Reserved for SIMATIC S7 application FC "ASI_3422". Command initiation via the user program possible.	
0	0	1	0	Command processing underway. Command inititation via the user program is not possible.	
0	0	0	1	Command processing terminated. A return value of **2 bytes** can be fetched from the AS-i master with an asynchronous read access. Two cases are distinguished here: • The return value is **0000_H**: A command without reply data has been completed **without errors**. • The return value is **not equal to 0000_H**: The command has been completed **with errors** (See the section "Coding of the return value in the receive buffer"). Initiation of a new command via the user program is possible.	
0	0	1	1	Command processing has been completed without errors. Reply data of **1 byte** can be fetched from the AS-i master with an asynchronous read access. Initiation of a new command via the user program is possible.	
0	1	0	1	Command processing has been completed without errors. Reply data of **4 bytes** can be fetched from the AS-i master with an asynchronous read access. Initiation of a new command via the user program is possible.	
0	1	1	1	Command processing has been completed without errors. Reply data of **14 bytes** can be fetched from the AS-i master with an asynchronous read access. Initiation of a new command via the user program is possible.	
1	0	0	1	Command processing has been completed without errors. Reply data of **16 bytes** can be fetched from the AS-i master with an asynchronous read access. Initiation of a new command via the user program is possible.	
1	0	1	1	Command processing has been completed without errors. Reply data of **32 bytes** can be fetched from the AS-i master with an asynchronous read access. Initiation of a new command via the user program is possible.	
1	1	0	1	Command processing has been completed without errors. Reply data of **56 bytes** can be fetched from the AS-i master with an asynchronous read access. Initiation of a new command via the user program is possible.	
1	1	1	1	Command processing has been completed without errors. Reply data of **221 bytes** can be fetched from the AS-i master with an asynchronous read access. Initiation of a new command via the user program is possible.	
0	1	0	0	Job processing is completed. The reply data or the return value of the previous job have already been read by the user. Initiation of a new command via the user program is possible.	

7.1.6 Example of changing the status nibble

The table below shows how the value of the status nibble changes as a result of the device status and command processing in the user program:

Table 7-3 Example of changing the status nibble

	Action	Response in the status nibble
1.	Switching on of the AS-i voltage on the DP / AS-i F-Link	1110_B....1000_B.....1110_B....
2.	The user program transfers a command (e.g. Write_parameter) to the DP / AS-i F-Link with an asynchronous write access	0010_B (brief, dependent on command)
3.	The AS-i master terminates the command. The return value is available to the user program	0001_B
4.	The user program reads the return value of 2 bytes with an asynchronous read access	0100_B
5.	....further program processing....	...
6.	The user program transfers a command (e.g.: Get_LPS, Get_LAS, Get_LDS, Get_Flags) to the DP / AS-i F-Link with an asynchronous write access	0010_B (brief, dependent on command)
7.	The AS-i master terminates the command without errors. The reply data are available to the user program	1011_B
8.	The user program reads the reply data of 32 bytes with an asynchronous read access	0100_B

7.1.7 Coding of the return value in the receive buffer

The return value of the receive buffer can contain an error message.

An error is indicated if the status nibble contains the coding "0001_B". This indicates that a command has been "terminated without errors and without reply data or terminated with errors".
We distinguish between 2 cases here:

- The return value is 0000_H:
  A command without reply data has been completed **without errors**
- The return value is **not equal to** 0000_H:
  The command has been terminated **with errors**

Table 7-4 Coding of the return value in the receive buffer

2-byte return value	Meaning
0000_H	**Request completed without errors**
8381_H	The AS-i slave is incorrect
8382_H	The AS-i slave is not activated (not in LAS).
8383_H	Error on the AS-Interface
8384_H	The command is not permitted in the current state of the AS-i master.
8385_H	An AS-i slave with address 0 exists.
8386_H	The AS-i slave has invalid configuration data (I/O or ID codes).
$83A1_H$	The requested AS-i slave was not found on the AS-Interface.
$83A2_H$	An AS-i slave with address 0 exists.
$83A3_H$	An AS-i slave with the new address already exists on the AS-Interface.
$83A4_H$	The AS-i slave address cannot be deleted.
$83A5_H$	The AS-i slave address cannot be set.
$83A6_H$	The AS-i slave address cannot be permanently saved.
$83A7_H$	Error while reading the Extended ID1 code
$83A8_H$	The target address is not plausible (e.g. a B slave address is used for a standard slave).
$83B1_H$	A length error occurred during the string transfer to profile 7.4
$83B2_H$	A protocol error occurred during the string transfer to profile 7.4
$83F8_H$	The job number or the job parameter is not known.
$83F9_H$	The AS-i master has detected an EEPROM error

Note

Error messages via call parameters

You can find errors occuring during processing of acyclic services and reported via call parameters such as "Return Value" in the documentation of the relevant programming interface.

7.2 Command interface in SIMATIC S7

7.2.1 Functional principle of the command interface in SIMATIC S7

When using a SIMATIC S7 as the PROFIBUS DP master, the function FC ASI_3422 offers a user-friendly command interface.

The function FC ASI_3422:

- Completes transfer of the command
- Completes transfer of reply data
- Administers the calls Write_data_record and Read_data_record autonomously

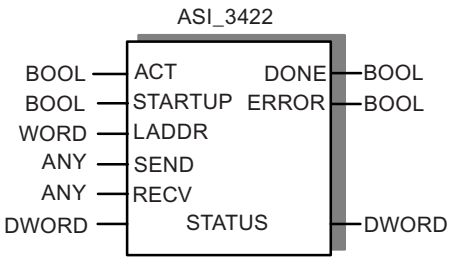


Figure 7-3 Function FC ASI_3422 on SIMATIC S7

Note

Download of the function "ASi_3422"

The function "ASi_3422" Version 2.0 is available free from the Internet address http://support.automation.siemens.com/WW/view/en/24063754 on the "Downloads" tab:

7.2.2 Formal parameters of the function FC ASI_3422

There are the following formal parameters for the function FC ASI_3422 of a SIMATIC S7:

Table 7-5 Formal parameters of the function FC ASI_3422

Parameters	Declaration	Data type	Memory area	Description
ACT	INPUT	BOOL	I,Q,M,D,L,constants	While ACT = 1, command processing is started if a call is not already being processed.
STARTUP	INPUT	BOOL	I,Q,M,D,L,constants	A CPU startup is communicated to the FC by STARTUP = 1. After the first function pass, STARTUP must be reset by the user program.
LADDR	INPUT	WORD	I,Q,M,D,L,constants	Start address of the non-safe address area of the DP / AS-i F-Link in the S7 address space The module start address is defined during STEP 7 configuring.
SEND	INPUT	ANY	I,Q,M,D,L	Send buffer The formal parameter points to a memory area in which the command has to be specified by the user. e.g.: P#DB20.DBX 20.0 Byte 10
RECV	INPUT	ANY	I,Q,M,D,L	Receive buffer This buffer is only relevant for commands that supply reply data. The formal operand points to a memory area in which a command reply is stored. The length specification in the ANY pointer parameterized here is irrelevant. The length of the reply data is calculated by the FC itself. e.g.: P#DB30.DBX 20.0 Byte 1
DONE	OUTPUT	BOOL	Q,M,D,L	"Job complete without errors" is signaled by DONE = 1.
ERROR	OUTPUT	BOOL	Q,M,D,L	"Job complete with errors" is signaled by ERROR = 1.
STATUS	INPUT / OUTPUT	DWORD	M,D	1. Word: Job status / error code (see the table "Codiung of the return value of the formal parameters DONE, ERROR and STATUS" In the case of "Job complete with errors", an error code is generated for more detailed error description. 2nd word: Required by the FC for internal purposes and must **not** be modified. Note: For FC calls to different DP / AS-i F-Links, different doublewords must be assigned for the STATUS parameter!

7.2.3 Command processing with the function FC ASI_3422

Structure command processing in the user program as follows:

1. In the cold restart branch of your S7 user program, call the function FC ASI_3422 once with the parameter value STARTUP = TRUE.
2. Specify the command call in a send buffer within the user program.
3. Transfer this send buffer with the call parameter SEND.
4. You require a reply buffer depending on the command type. Transfer this receive buffer with the call parameter RECV.
   The receive buffer of the function FC ASI_3422 is not required for status information.
5. Activate the job via the parameter ACT = 1.
6. Scan the parameters DONE, ERROR and STATUS.
   Please note the signal chart of these parameters when programming the user program. This is shown in the section "Example of signal chart for the formal parameters ACT, DONE, ERROR and STATUS".

Notice

Please observe the following:

- You can continue to use programs written for the DP / AS-i Link 20E if you adapt the configured logical addresses.
- If you use the FC interface FC ASI_3422 for issuing commands, you may not simultaneously transmit other commands with data record 2 via the interface Read_data_record and Write_data_record.
- Use FC ASI_3422 in Version 2.0 or higher.
- FC ASI_3422 is not reentrant-enabled! FC calls must therefore not be programmed in program execution levels that interrupt each other (e.g. with calling in OB 1 **and** in OB 35).
- With SIMATIC S7, only a limited number of Read_data_record and Write_data_record jobs can be active simultaneously. The maximum permissible number depends on the S7-CPU. If more jobs are initiated, these are terminated with error $80C3_H$ (temporary resource bottleneck). The rejected job must then be repeated.

7.2.4 Example of the signal chart for the formal parameters ACT, DONE, ERROR and STATUS

In the following example you see the changes in the formal parameters ACT, DONE, ERROR and STATUS during job processing.

A command call is started by ACT = 1. During job processing, the first word of STATUS receives the value 8181_H.. When the job is complete, the formal parameters DONE or ERROR contains the following results:

- DONE is set if no error has occurred.
  RECV specifies the receive buffer if reply data of the DP / AS-i F-Link are available.
  In this case, STATUS contains the value 0000_H in the first word.
- ERROR is set if an error has occurred.
  Reply data of the DP / AS-i F-Link are not available.
  STATUS contains an error code in the first word for closer description of the error.

The formal parameters DONE, ERROR and STATUS remain unchanged until the next job is processed.

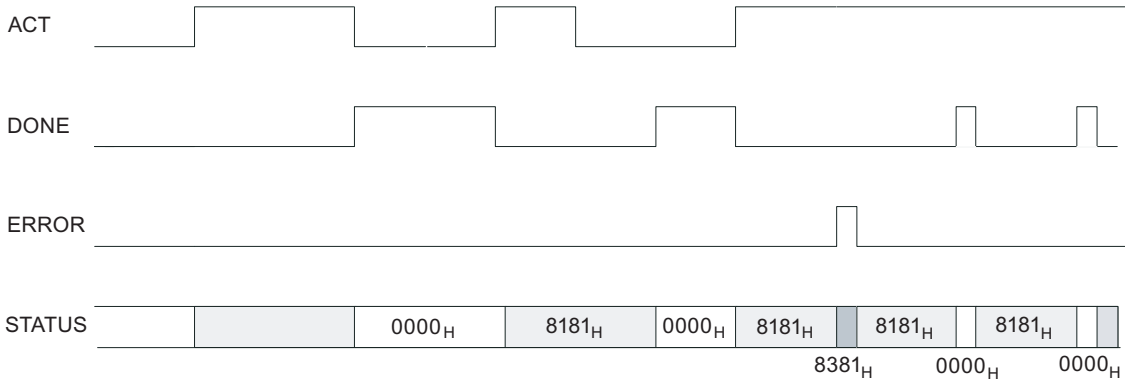


Figure 7-4 Example of the signal chart for the formal parameters ACT, DONE, ERROR and STATUS

7.2.5 Coding of the return values of the formal parameters DONE, ERROR and STATUS

The table below shows the return values for job processing status and error messages in the first word of STATUS as well as their combination with the formal parameters DONE and ERROR:

Table 7-6 Coding of the return values of the formal parameters DONE, ERROR and STATUS

DONE	ERROR	STATUS	Meaning
1	0	0000_H	**Request completed without errors**
0	1	8090_H	Address in LADDR invalid
0	1	8092_H	A type other than BYTE has been specified in the ANY reference
0	1	8093_H	This SFC is not permissible for the module selected via LADDR and IOID (S7-300 modules are permissible on S7-300, S7-400 modules on S7-400, and S7-DP modules on S7-300 and S7-400)
0	1	$80A0_H$	Negative acknowledgement when reading from the AS-i master
0	1	$80A1_H$	Negative acknowledgement when writing to the AS-i master
0	1	$80A2_H$	PROFIBUS-DP protocol error in layer2
0	1	$80A3_H$	PROFIBUS-DP protocol error in user interface/user
0	1	$80A4_H$	Communication fault on K bus
0	1	$80B0_H$	AS-i master does not know the data record
0	1	$80B1_H$	Specified data record length incorrect
0	1	$80B2_H$	Configured slot not occupied
0	1	$80B3_H$	Actual module type is not the module type specified in SDB1.
0	1	$80C0_H$	Data record cannot be read
0	1	$80C1_H$	Specified data record being processed
0	1	$80C2_H$	Job queue
0	1	$80C3_H$	Resources (memory) occupied
0	1	$80C4_H$	Communication error
0	1	$80C5_H$	Distributed I/O not available
0	1	$80C6_H$	Data record transfer cancelled due to priority class abort (warm restart or background) of the distributed I/O
0	0	8181_H	**Job running (no error)**
0	1	8182_H	ID after cold restart (STARTUP = TRUE)
0	1	8184_H	Data type of the RECV formal operand invalid.
0	1	8381_H	AS-i address incorrect
0	1	8382_H	AS-i slave not activated (not in LAS).
0	1	8383_H	Error on the AS-Interface
0	1	8384_H	Command not permitted in the current state of the AS-i master.
0	1	8385_H	An AS-i slave with address 0 exists.
0	1	8386_H	AS-i slave has invalid configuration data (I/O or ID codes).
0	1	$83A1_H$	Requested AS-i slave was not found on the AS-Interface.
0	1	$83A2_H$	An AS-i slave with address 0 exists.
0	1	$83A3_H$	An AS-i slave with the new address already exists on the AS-Interface.

DONE	ERROR	STATUS	Meaning	
0	1	$83A4_H$	The AS-i slave address cannot be deleted.	
0	1	$83A5_H$	The AS-i slave address cannot be set.	
0	1	$83A6_H$	The AS-i slave address cannot be permanently saved.	
0	1	$83A7_H$	Error while reading the Extended ID1 code	
0	1	$83A8_H$	The target address is not plausible (e.g. a B slave address is used for a standard slave).	
0	1	$83B1_H$	Length error occurred at string transfer according to profile 7.4	
0	1	$83B2_H$	Protocol error occurred at string transfer according to profile CTT 1 ... 5	
0	1	$83F8_H$	Job numbers or job parameters unknown	
0	1	$83F9_H$	AS-i master has detected an EEPROM error	
0	1	$8F22_H$	Area length error when reading a parameter	This error code indicates that a parameter is partially or completely outside the operand area or the length of a bit array for an ANY parameter is not divisible by 8.
0	1	$8F23_H$	Area length error when writing a parameter	
0	1	$8F24_H$	Area error when reading a parameter	This error code indicates that a parameter is located in an area that is impermissible for a system function
0	1	$8F25_H$	Area error when writing a parameter	
0	1	$8F28_H$	Orientation error when reading a parameter	This error code indicates that the reference to a parameter is an operand whose bit address is not equal to "0"
0	1	$8F29_H$	Orientation error when writing a parameter	
0	1	$8F30_H$	Parameter located in the write-protected global DB	This error code indicates that a parameter is located in a write-protected data block
0	1	$8F31_H$	Parameter located in the write-protected instance DB	
0	1	$8F32_H$	Parameter contains DB number that is too high	
0	1	$8F3A_H$	Parameter contains the number of a DB that is not loaded	
0	1	$8F42_H$	An access error has occurred while the system wanted to read out a parameter from the I/O area of the inputs	
0	1	$8F43_H$	An access error has occurred while the system wanted to write a parameter to the I/O area of the outputs	
0	1	$8F44_H$	Read access to a parameter has been denied	
0	1	$8F45_H$	Write access to a parameter has been denied	
0	1	$8F7F_H$	Internal error	

7.3 Description of the AS-i command

7.3.1 Use of the AS-i command

The AS-i commands that the PROFIBUS DP master can transmit to the DP / AS-i F-Link are described below.

With these AS-i commands

- The DP / AS-i F-Link provides the full functionality of master profile M4 of the AS-i master specification
- you can fully configure the DP / AS-i F-Link from the PROFIBUS DP master

You can learn which AS-i commands are supported and their functionality from

- The AS-i command overview and the individual command descriptions
- The "AS-Interface Protocol Implementation Conformance Statement (PICS)" in the Appendix
- The detailed explanations in /1/ and /2/

7.3.2 General structure of the send and receive buffer

General structure of the send buffer

The table below shows the general structure of the send buffer for commands and job data. The command number is always relevant here. The bytes for the job data are either included accordingly in the relevant command or they are empty.

Table 7-7 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
q + 0	Command number							
q + 1	Job data							
q + ...	Job data							

q = start address of the send buffer in the PROFIBUS DP master

General structure of the receive buffer

The table below shows the general structure of the receive buffer for reply data. Accordingly, the relevant command either contains the bytes for the reply data or is empty.

Table 7-8 Structure of the job data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
n + 0	Reply data							
n + 1	Reply data							
n + ...	Reply data							

n = start address of the receive buffer in the PROFIBUS DP master

7.3.3 General structure of the address byte of the AS-i slave

The structure of the AS-i address byte in a command or a command reply corresponds to the following schematic:

Table 7-9 Structure of the AS-i address byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
-	-	S bit	Slave address 0 to 31				

The select bit (S bit) for selecting the slave type has the following meaning:

- S bit = 0, standard AS-i slave or AS-i slave in the extended addressing mode in address area A
- S bit = 1, AS-i slave in extended addressing mode in address area B

7.3.4 Overview of the AS-i commands

Table 7-10 AS-i commands

Command name	Job data	Reply data	Command number
Set_Permanent_Parameter	Slave address, parameter	-	00_H
Get_Permanent_Parameter	Slave address	Parameters	01_H
Write_Parameter	Slave address, parameter	Parameter echo	02_H
Read_Parameter	Slave address	Parameters	03_H
Store_Actual_Parameters	-	-	04_H
Set_Extended_Permanent_Configuration	Slave address, configuration	-	25_H
Get_Extended_Permanent_Configuration	Slave address	Configured configuration data	26_H

Command name	Job data	Reply data	Command number
Store_Actual_Configuration	-	-	07_H
Read_Extended_Actual_Configuration_Data	Slave address	Actual configuration data	28_H
Set_LPS	LPS	-	29_H
Set_Offline_Mode	Mode	-	$0A_H$
Select_Auto_Programming	Mode	-	$0B_H$
Set_Operation_Mode	Mode	-	$0C_H$
Change_AS-i-Slave_Address	Address old, address new	-	$0D_H$
Read_AS-i-Slave_Status	Slave address	Error information of the AS-i slave	$0F_H$
Get_LPS, Get_LAS, Get_LDS, Get_Flags	-	LAS, LDS, LPS, flags	30_H
Read_Extended_Overall_Configuration	-	LAS, actual configuratio data, actual parameters, flags	39_H
Configure_Overall_Configuration	Overall configuration	-	$3A_H$
Write_Extended_Parameter_List	Parameter list	-	$3C_H$
Read_Extended_Parameter-echo_List	-	Parameter echo list	33_H
Read_Version_ID	-	Version string	14_H
Read_AS-i-Slave_ID	Slave address	ID code	17_H
Read_AS-i-Slave_Extended-ID1	Slave address	Extended ID1 code	37_H
Write_AS-i-Slave_Extended-ID1	Extended ID1 code	-	$3F_H$
Read_AS-i-Slave_Extended-ID2	Slave address	Extended ID2 code	38_H
Read_AS-i-Slave_I/O	Slave address	I/O configuration	18_H
Get_LPF	-	LPF	$3E_H$
Write_AS-i-Slave_Parameter-string	Slave address, parameter string	-	40_H
Read_AS-i-Slave_Parameter-string	Slave address	Parameter string	41_H
Read_AS-i-Slave_ID-string	Slave address	ID string	42_H
Read_AS-i-Slave_Diagnostics-string	Slave address	Diagnostics string	43_H
AS-i_Status/Diag_of_the_F_Slaves	-	Status/dagnostics of all ASIsafe slaves	51_H

7.3.5 Set_Permanent_Parameter

This call configures a parameter value for the specified AS-i slave in the DP / AS-i F-Link. The value is stored in non-volatile memory in the EEPROM of the DP / AS-i F-Link.

DP / AS-i F-Link **does not** transfer the configured parameter **immediately** to the AS-i slave. This parameter is not transferred until the supply voltage of the DP / AS-i F-Link is switched on and the AS-i slave is activated.
This call is **not** permissible for AS-i slaves that meet AS-i slave standard profile 7.4. For these AS-i slaves, the AS-i master itself administers the AS-i slave parameterization. In this case, the configured parameters are always equal to F_H.

Note

This command is not required when using a failsafe SIMATIC S7

If you use a failsafe SIMATIC S7 as the PROFIBUS DP master, this sends a complete AS-i slave configuration to the DP / AS-i F-Link, if necessary, during PROFIBUS DP startup, depending on the STEP 7 configuration. Use of the call described here is then usually superfluous.

Table 7-11 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 00_H							
1	Slave address							
2	Irrelevant				Parameters			

7.3.6 Get_Permanent_Parameter

A slave-specific parameter value stored in the EEPROM of the DP / AS-i F-Link is read with this call.

Table 7-12 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 01_H							
1	Slave address							

Table 7-13 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved				Configured parametera			

7.3.7 Write_Parameter

The AS-i slave parameter transferred with the command is forwarded to the addressed AS-i slave.

The parameter is only stored in **volatile memory**in the DP / AS-i F-Link and it is not transferred to the EEPROM as a configured parameter!

The AS-i slave transfers its current parameter value (parameter echo) in the reply data. In accordance with the AS-i master specification (/2/), this can deviate from the value just written.

This call is **not** permissible for AS-i slaves that meet AS-i slave standard profile 7.4. For these AS-i slaves, the AS-i master itself administers the AS-i slave parameterization.

Table 7-14 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 02_H							
1	Slave address							
2	Irrelevant				Parameters			

Table 7-15 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved				Parameter echo			

7.3.8 Read_Parameter

With this call the current parameter value (actual parameter) of an AS-i slave sent by the DP / AS-i F-Link is delivered back.

This value must not be confused with the parameter echo that the AS-i slave supplies as reply to Write_Parameter.

Table 7-16 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 03_H							
1	Slave address							

Table 7-17 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved				Parameters			

7.3.9 Store_Actual_Parameters

With this call, the configured parameters stored on EEPROM are overwritten with the current (actual) parameters stored in non-volatile memory. The parameters of all AS-i slaves are then configured.

For AS-i slaves that meet AS-i slave standard profile 7.4, the AS-i master itself administers parameterization of the AS-i slaves. The configured parameters for these AS-i slaves are always equal to F_H.

Table 7-18 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 04_H							

7.3.10 Set_Extended_Permanent_Configuration

With this call, the following configuration data are configured for the addressed AS-i slave:

- I/O configuration
- ID code
- Extended ID1 code
- Extended ID2 code

The configuration data are stored in non-volatile memory in the EEPROM of the DP / AS-i F-Link. The AS-i master uses them as the setpoints for protected mode. The configuration data are defined by the manufacturer of the AS-i slave.
If the addressed AS-i slave does not support extended ID1 / 2 code, the value F_H must be specified in the call for this.
When this command is executed, the AS-i master changes to the offline phase and then returns to normal mode (restart of the AS-i master).
In protected mode, this call is **not** executed.

Note

This command is not required when using a failsafe SIMATIC S7

If you use a failsafe SIMATIC S7 as the PROFIBUS DP master, this sends a complete AS-i slave configuration to the DP / AS-i F-Link, if necessary, during PROFIBUS DP startup, depending on the STEP 7 configuration. Use of the call described here is then usually superfluous.

Table 7-19 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 25_H							
1	Slave address							
2	ID code				I/O configuration			
3	Extended ID1 code				Extended ID2 code			

7.3.11 Get_Extended_Permanent_Configuration

The configuration data (configured setpoints) of an addressed AS-i slave stored on the EEPROM of the AS-i master are read with this call:

- I/O configuration
- ID code
- Extended ID1 code
- Extended ID2 code

The configuration data are defined by the manufacturer of the AS-i slave.

Table 7-20 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 26_H							
1	Slave address							

Table 7-21 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	ID code				I/O configuration			
1	Extended ID1 code				Extended ID2 code			
2	Reserved							
3	Reserved							

7.3.12 Store_Actual_Configuration

With this call, the (actual) configuration data of all AS-i slaves determined in the AS-Interface (I/O configuration, ID code, extended ID1 code and extended ID2 code) are stored on non-volatile EEPROM as (planned) configuration data. The list of activated AS-i slaves (LAS) is also accommodated into the list of configured AS-i slaves (LPS).

When this command is executed, the AS-i master changes to the offline phase and then returns to normal operation (cold restart of the AS-i master).
This call is **not** executed in protected mode.

Note

This command is not required when using a failsafe SIMATIC S7

If you use a failsafe SIMATIC S7 as the PROFIBUS DP master, this sends a complete AS-i slave configuration to the DP / AS-i F-Link, if necessary, during PROFIBUS DP startup, depending on the STEP 7 configuration. Use of the call described here is then usually superfluous.

Table 7-22 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 07_H							

7.3.13 Read_Extended_Actual_Configuration

The following configuration data of an addressed AS-i slave determined by the AS-i master on the AS-Interface are read with this call:

- I/O configuration
- ID code
- Extended ID1 code
- Extended ID2 code

The configuration data are defined by the manufacturer of the AS-i slave.

Table 7-23 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 28_H							
1	Slave address							

Table 7-24 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	ID code				I/O configuration			
1	Extended ID1 code				Extended ID2 code			
2	Reserved							
3	Reserved							

7.3.14 Set_LPS

This call transfers the list of configured AS-i slaves for non-volatile storage in the EEPROM of the master.

When this command is executed, the AS-i master changes to the offline phase and then returns to normal operation (cold restart of the AS-i master).
This call is **not** executed in protected mode.

Note

This command is not required when using a failsafe SIMATIC S7

If you use a failsafe SIMATIC S7 as the PROFIBUS DP master, this sends a complete AS-i slave configuration to the DP / AS-i F-Link, if necessary, during PROFIBUS DP startup, depending on the STEP 7 configuration. Use of the call described here is then usually superfluous.

Table 7-25 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 29_H							
1	00_H							
2	Irrelevant	Slave 1 / 1A	Slave 2 / 2A	Slave 3 / 3A	Slave 4 / 4A	Slave 5 / 5A	Slave 6 / 6A	Slave 7 / 7A
3	Slave 8 / 8A	Slave 9 / 9A	Slave 10 / 10A	Slave 11 / 11A	Slave 12 / 12A	Slave 13 / 13A	Slave 14 / 14A	Slave 15 / 15A
4	Slave 16 / 16A	Slave 17 / 17A	Slave 18 / 18A	Slave 19 / 19A	Slave 20 / 20A	Slave 21 / 21A	Slave 22 / 22A	Slave 23 / 23A
5	Slave 24 / 24A	Slave 25 / 25A	Slave 26 / 26A	Slave 27 / 27A	Slave 28 / 28A	Slave 29 / 29A	Slave 30 / 30A	Slave 31 / 31A
6	Irrelevant	Slave 1B	Slave 2B	Slave 3B	Slave 4B	Slave 5B	Slave 6B	Slave 7B
7	Slave 8B	Slave 9B	Slave 10B	Slave 11B	Slave 12B	Slave 13B	Slave 14B	Slave 15B
8	Slave 16B	Slave 17B	Slave 18B	Slave 19B	Slave 20B	Slave 21B	Slave 22B	Slave 23B

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
9	Slave 24B	Slave 25B	Slave 26B	Slave 27B	Slave 28B	Slave 29B	Slave 30B	Slave 31B

The bits have the following meanings in the LPS data:

- Bit = 0: AS-i slave is **not** configured
- Bit = 1: AS-i slave **is** configured

7.3.15 Set_Offline_Mode

This call switches between online and offline mode.

Online mode is the normal mode for the AS-i master. The following jobs are processed cyclically here:

- In the data exchange phase, the fields of the output data are transferred to the slave outputs for all AS-i slaves of the LAS. In error-free transmission, the addressed AS-i slaves transfer the values of the slave inputs to the master.
- This is followed by the acceptance phase in which a search is made for the available AS-i slaves and newly added AS-i slaves are accepted into the LDS or LAS.
- In the management phase, jobs forwarded by the user, such as writing parameters, are executed.

In **offline mode** the DP / AS-i F-Link only processes jobs from the user. Jobs that immediately activate an AS-i slave are rejected with an error. Cycle data exchange with the AS-i slaves is carried out.
The bit "OFFLINE = TRUE" is not permanently saved. After startup or warm restart, the DP / AS-i F-Link is in online mode.

Table 7-26 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $0A_H$							
1	Reserved[1)]							Mode 0 = Online 1 = Offline

Re 1) Assign "0" to reserved bits in the case of write access

7.3.16 Select_Auto_Programming

The function "Automatic address programming" can be enabled or disabled with this call.

The bit "AUTO_ADDR_ENABLE" is stored in non-volatile memory. It is retained even after startup or warm restart of the AS-i master.

Table 7-27 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $0B_H$							
1	Reserved[1)]							1 = enabled 0 = disabled

Re 1) Assign "0" to reserved bits in the case of write access

See also

Replacing an AS-i slave/automatic address programming (Page 8-14)

7.3.17 Set_Operation_Mode

You can choose between config mode and protected mode with this call.

In "**Protected mode**", only those AS-i slaves are activated that are flagged in the LPS and whose planned configuration agrees with their actual configuration, that is, the I/O configuration and the ID codes of the detected AS-i slaves are identical to the configured values.
In **Config mode**, all detected AS-i slaves (except AS-i slaves with the address "0") are activated. This also applies for AS-i slaves in which there are differences between the planned and the actual configuration.
The bit "OPERATING MODE" is stored in **non-volatile** memory. It is retained even in the event of startup/warm restart.
When changing from config mode to protected mode, the AS-i master carries out a cold restart. A transition is then made to the offline phase and this is followed by a switch to online mode.

Note

No change to protected mode possible while an AS-i slave address = 0

If an AS-i slave with "0" is entered in the LDS, the DP / AS-i F-Link cannot switch from config mode to protected mode.

Table 7-28 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $0C_H$							
1	Reserved[1)]							0 = Protected mode 1 = Config mode

Re 1) Assign "0" to reserved bits in the case of write access

7.3.18 Change_AS-i-Slave_Address

This call changes the AS-i address of an AS-i slave.

This call is used predominantly for adding a new AS-i slave with the default address "0" to the AS-Interface. In this case, change the previous AS-i slave address "0" to a new AS-i slave address.
The following conditions must be met for the change to be successful:

1. An AS-i slave with the previous AS-i slave address must be available
2. If the previous AS-i address is not equal to "0", an AS-i slave with the address "0" must not be connected
3. The new AS-i slave address must have a valid value
4. There must not already be an AS-i slave with the new AS-i slave address

Remark: When changing the AS-i address, the AS-i slave is not reset. The output data of the AS-i slave are retained until new data are sent to the new address.

Table 7-29 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $0D_H$							
1	Previous AS-i slave address							
2	New AS-i slave address							

7.3.19 Read_AS-i-Slave_Status

The status register of the addressed AS-i slave can be read out with this call.

The flags of the status register have the following meaning depending on the type of the AS-i slave:

Table 7-30 Meaning of the flags in the status register

Status bit	AS-i slave in accordance with the standard 2.0	AS-i slave in accordance with the standard 2.1
S0	**Address volatile**	**Address/ID code volatile**
	This flag is set if: • the AS-i slave-internal routine for permanent storage of the AS-i slave address is running. This can last up to 15 ms and must not be interrupted by another addressing call • the AS-i slave-internal address comparison determines that the permanently saved address is not identical to the entry in the address register	
S1	**Parity error detected** This flag is set if the AS-i slave has detected a parity error in a receive frame since the last "Read and delete status" job	**I/O error detected** An AS-i slave can set this flag if it detects a fault (e.g. wirebreak) on the connected I/O
S2	**End-bit error detected** This flag is set if the AS-i slave has detected an end-bit error in a frame since the last "Read and delete status" job	Reserved
S3	**Read error in the non-volatile memory** This bit is set if the AS-i slave has discovered a read error when reading the non-volatile memory	

Table 7-31 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $0F_H$							
1	Slave address							

Table 7-32 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	0	0	0	0	S3	S2	S1	S0

7.3.20 Get_LPS, Get_LAS, Get_LDS, Get_Flags

The following entries are read from the DP / AS-i F-Link with this call:

- List of active AS-i slaves, LAS
- List of detected AS-i slaves, LDS
- List of configured AS-i slaves, LPS
- The flags in accordance with the AS-i slave specification

Table 7-33 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 30_H							

Table 7-34 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	LAS slave 0	LAS slave 1 / 1A	LAS slave 2 / 2A	LAS slave 3 / 3A	LAS slave 4 / 4A	LAS slave 5 / 5A	LAS slave 6 / 6A	LAS slave 7 / 7A
1	LAS slave 8 / 8A	LAS slave 9 / 9A	LAS slave 10 / 10A	LAS slave 11 / 11A	LAS slave 12 / 12A	LAS slave 13 / 13A	LAS slave 14 / 14A	LAS slave 15 / 15A
2	LAS slave 16 / 16A	LAS slave 17 / 17A	LAS slave 18 / 18A	LAS slave 19 / 19A	LAS slave 20 / 20A	LAS slave 21 / 21A	LAS slave 22 / 22A	LAS slave 23 / 23A
3	LAS slave 24 / 24A	LAS slave 25 / 25A	LAS slave 26 / 26A	LAS slave 27 / 27A	LAS slave 28 / 28A	LAS slave 29 / 29A	LAS slave 30 / 30A	LAS slave 31 / 31A
4	Reserved	LAS slave 1B	LAS slave 2B	LAS slave 3B	LAS slave 4B	LAS slave 5B	LAS slave 6B	LAS slave 7B
5	LAS slave 8B	LAS slave 9B	LAS slave 10B	LAS slave 11B	LAS slave 12B	LAS slave 13B	LAS slave 14B	LAS slave 15B
6	LAS slave 16B	LAS slave 17B	LAS slave 18B	LAS slave 19B	LAS slave 20B	LAS slave 21B	LAS slave 22B	LAS slave 23B

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
7	LAS slave 24B	LAS slave 25B	LAS slave 26B	LAS slave 27B	LAS slave 28B	LAS slave 29B	LAS slave 30B	LAS slave 31B
8	LDS slave 0	LDS slave 1 / 1A	LDS slave 2 / 2A	LDS slave 3 / 3A	LDS slave 4 / 4A	LDS slave 5 / 5A	LDS slave 6 / 6A	LDS slave 7 / 7A
9	LDS slave 8 / 8A	LDS slave 9 / 9A	LDS slave 10 / 10A	LDS slave 11 / 11A	LDS slave 12 / 12A	LDS slave 13 / 13A	LDS slave 14 / 14A	LDS slave 15 / 15A
10	LDS slave 16 / 16A	LDS slave 17 / 17A	LDS slave 18 / 18A	LDS slave 19 / 19A	LDS slave 20 / 20A	LDS slave 21 / 21A	LDS slave 22 / 22A	LDS slave 23 / 23A
11	LDS slave 24 / 24A	LDS slave 25 / 25A	LDS slave 26 / 26A	LDS slave 27 / 27A	LDS slave 28 / 28A	LDS slave 29 / 29A	LDS slave 30 / 30A	LDS slave 31 / 31A
12	Reserved	LDS slave 1B	LDS slave 2B	LDS slave 3B	LDS slave 4B	LDS slave 5B	LDS slave 6B	LDS slave 7B
13	LDS slave 8B	LDS slave 9B	LDS slave 10B	LDS slave 11B	LDS slave 12B	LDS slave 13B	LDS slave 14B	LDS slave 15B
14	LDS slave 16B	LDS slave 17B	LDS slave 18B	LDS slave 19B	LDS slave 20B	LDS slave 21B	LDS slave 22B	LDS slave 23B
15	LDS slave 24B	LDS slave 25B	LDS slave 26B	LDS slave 27B	LDS slave 28B	LDS slave 29B	LDS slave 30B	LDS slave 31B
16	LPS slave 0	LPS slave 1 / 1A	LPS slave 2 / 2A	LPS slave 3 / 3A	LPS slave 4 / 4A	LPS slave 5 / 5A	LPS slave 6 / 6A	LPS slave 7 / 7A
17	LPS slave 8 / 8A	LPS slave 9 / 9A	LPS slave 10 / 10A	LPS slave 11 / 11A	LPS slave 12 / 12A	LPS slave 13 / 13A	LPS slave 14 / 14A	LPS slave 15 / 15A
18	LPS slave 16 / 16A	LPS slave 17 / 17A	LPS slave 18 / 18A	LPS slave 19 / 19A	LPS slave 20 / 20A	LPS slave 21 / 21A	LPS slave 22 / 22A	LPS slave 23 / 23A
19	LPS slave 24 / 24A	LPS slave 25 / 25A	LPS slave 26 / 26A	LPS slave 27 / 27A	LPS slave 28 / 28A	LPS slave 29 / 29A	LPS slave 30 / 30A	LPS slave 31 / 31A
20	Reserved	LPS slave 1B	LPS slave 2B	LPS slave 3B	LPS slave 4B	LPS slave 5B	LPS slave 6B	LPS slave 7B
21	LPS slave 8B	LPS slave 9B	LPS slave 10B	LPS slave 11B	LPS slave 12B	LPS slave 13B	LPS slave 14B	LPS slave 15B
22	LPS slave 16B	LPS slave 17B	LPS slave 18B	LPS slave 19B	LPS slave 20B	LPS slave 21B	LPS slave 22B	LPS slave 23B
23	LPS slave 24B	LPS slave 25B	LPS slave 26B	LPS slave 27B	LPS slave 28B	LPS slave 29B	LPS slave 30B	LPS slave 31B
24	Flag 1							
25	Flag 2							
26	Reserved							
27	Reserved							
28	Reserved							
29	Reserved							
30	Reserved							
31	Reserved							

Meaning of the bits of Byte 0 to Byte 23:

- Bit = 0: The AS-i slave is **not** activated, detected or configured
- Bit = 1: The AS-i slave **is** activated, detected or configured

Table 7-35 Description of the flag contents of flag 1

Bit	Meaning	Description
0	OFFLINE_READY	The flag is set if the offline phase is active.
1	APF	The flag is set if the voltage on the AS-i cable is too low.
2	NORMAL_MODE	The flag is set when the DP / AS-i F-Link is in normal mode.
3	OPERATING MODE	The flag is set in configuring mode and reset in protected mode.
4	AUTO_ADDR_AVAIL	The flag is set if automatic address programming can be carried out (i.e. precisely **one** AS-i slave has currently failed).
5	AUTO_ADDR_ASSIGN	The flag is set if automatic address programming is possible (that is, AUTO_ADDR_ENABLE = 1 **and** no "incorrect" AS-i slave is connected to the AS-Interface).
6	LDS_0	The flag is set if an AS-i slave with operating address "0" is available.
7	CONFIG_OK	The flag is set when the planned configuration and the actual configuration agree.

Table 7-36 Description of the flag contents of flag 2

Bit	Meaning	Description
0	OFFLINE	The flag is set if the operating status "OFFLINE" is to be adopted or has already been adopted.
1	INTERNAL	The flag is always set.
2	EEPROM_OK	The flag is set if the test of the internal EEPROM was successful.
3	AUTO_ADDR_ENABLE	The flag indicates whether automatic address programming by the user is disabled (BIT = 0) or enabled (BIT = 1).
4	PERIPHERY_FAULT	The flag is set if at least one AS-i slave signals an I/O fault.
5	Reserved	-
6	Reserved	-
7	MPO startup	The flag "Master_Power_on-startup" is set after the supply voltage of the AS-i slave master has been switched on. The bit is reset when the master changes later to OFFLINE.

7.3.21 Read_Extended_Overall_Configuration

The following data are read from the DP / AS-i F-Link with this command:

- The list of active AS-i slaves (LAS). It specifies which of the connected AS-i slaves are activated
- The current configuration data of the connected AS-i slaves (I/O configuration and ID code)
- The current parameters of the AS-i slaves (actual parameters)
- The current flags

The command can be used, for example, to determine the configuration of the nodes connected to the AS-i bus after startup. These read-in configuration data can be modified if required and stored in the DP / AS-i F-Link as the planned configuration with the command "Set_Extended_Overall_Configuration".

Table 7-37 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 39_H							

Table 7-38 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	00_H							
1	00_H							
2	LAS slave 0	LAS slave 1 / 1A	LAS slave 2 / 2A	LAS slave 3 / 3A	LAS slave 4 / 4A	LAS slave 5 / 5A	LAS slave 6 / 6A	LAS slave 7 / 7A
3	LAS slave 8 / 8A	LAS slave 9 / 9A	LAS slave 10 / 10A	LAS slave 11 / 11A	LAS slave 12 / 12A	LAS slave 13 / 13A	LAS slave 14 / 14A	LAS slave 15 / 15A
4	LAS slave 16 / 16A	LAS slave 17 / 17A	LAS slave 18 / 18A	LAS slave 19 / 19A	LAS slave 20 / 20A	LAS slave 21 / 21A	LAS slave 22 / 22A	LAS slave 23 / 23A
5	LAS slave 24 / 24A	LAS slave 25 / 25A	LAS slave 26 / 26A	LAS slave 27 / 27A	LAS slave 28 / 28A	LAS slave 29 / 29A	LAS slave 30 / 30A	LAS slave 31 / 31A
6	Reserved	LAS slave 1B	LAS slave 2B	LAS slave 3B	LAS slave 4B	LAS slave 5B	LAS slave 6B	LAS slave 7B
7	LAS slave 8B	LAS slave 9B	LAS slave 10B	LAS slave 11B	LAS slave 12B	LAS slave 13B	LAS slave 14B	LAS slave 15B
8	LAS slave 16B	LAS slave 17B	LAS slave 18B	LAS slave 19B	LAS slave 20B	LAS slave 21B	LAS slave 22B	LAS slave 23B
9	LAS slave 24B	LAS slave 25B	LAS slave 26B	LAS slave 27B	LAS slave 28B	LAS slave 29B	LAS slave 30B	LAS slave 31B
10	ID_CODE slave 0				I/O configuration slave 0			
11	Ext ID1 slave 0				Ext ID2 slave 0			
12	ID_CODE slave 1 / 1A				I/O configuration slave 1 / 1A			
13	Ext ID1 slave 1 / 1A				Ext ID2 slave 1 / 1A			
14	ID_CODE slave 2 / 2A				I/O configuration slave 2 / 2A			
15	Ext ID1 slave 2 / 2A				Ext ID2 slave 2 / 2A			
16	ID_CODE slave 3 / 3A				I/O configuration slave 3 / 3A			
17	Ext ID1 slave 3 / 3A				Ext ID2 slave 3 / 3A			
18	ID_CODE slave 4 / 4A				I/O configuration slave 4 / 4A			
19	Ext ID1 slave 4 / 4A				Ext ID2 slave 4 / 4A			
20	ID_CODE slave 5 / 5A				I/O configuration slave 5 / 5A			
21	Ext ID1 slave 5 / 5A				Ext ID2 slave 5 / 5A			
22	ID_CODE slave 6 / 6A				I/O configuration slave 6 / 6A			
23	Ext ID1 slave 6 / 6A				Ext ID2 slave 6 / 6A			
24	ID_CODE slave 7 / 7A				I/O configuration slave 7 / 7A			
25	Ext ID1 slave 7 / 7A				Ext ID2 slave 7 / 7A			
26	ID_CODE slave 8 / 8A				I/O configuration slave 8 / 8A			
27	Ext ID1 slave 8 / 8A				Ext ID2 slave 8 / 8A			
28	ID_CODE slave 9 / 9A				I/O configuration slave 9 / 9A			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
29	Ext ID1 slave 9 / 9A				Ext ID2 slave 9 / 9A			
30	ID_CODE slave 10 / 10A				I/O configuration slave 10 / 10A			
31	Ext ID1 slave 10 / 10A				Ext ID2 slave 10 / 10A			
32	ID_CODE slave 11 / 11A				I/O configuration slave 11 / 11A			
33	Ext ID1 slave 11 / 11A				Ext ID2 slave 11 / 11A			
34	ID_CODE slave 12 / 12A				I/O configuration slave 12 / 12A			
35	Ext ID1 slave 12 / 12A				Ext ID2 slave 12 / 12A			
36	ID_CODE slave 13 / 13A				I/O configuration slave 13 / 13A			
37	Ext ID1 slave 13 / 13A				Ext ID2 slave 13 / 13A			
38	ID_CODE slave 14 / 14A				I/O configuration slave 14 / 14A			
39	Ext ID1 slave 14 / 14A				Ext ID2 slave 14 / 14A			
40	ID_CODE slave 15 / 15A				I/O configuration slave 15 / 15A			
41	Ext ID1 slave 15 / 15A				Ext ID2 slave 15 / 15A			
42	ID_CODE slave 16 / 16A				I/O configuration slave 16 / 16A			
43	Ext ID1 slave 16 / 16A				Ext ID2 slave 16 / 16A			
44	ID_CODE slave 17 / 17A				I/O configuration slave 17 / 17A			
45	Ext ID1 slave 17 / 17A				Ext ID2 slave 17 / 17A			
46	ID_CODE slave 18 / 18A				I/O configuration slave 18 / 18A			
47	Ext ID1 slave 18 / 18A				Ext ID2 slave 18 / 18A			
48	ID_CODE slave 19 / 19A				I/O configuration slave 19 / 19A			
49	Ext ID1 slave 19 / 19A				Ext ID2 slave 19 / 19A			
50	ID_CODE slave 20 / 20A				I/O configuration slave 20 / 20A			
51	Ext ID1 slave 20 / 20A				Ext ID2 slave 20 / 20A			
52	ID_CODE slave 21 / 21A				I/O configuration slave 21 / 21A			
53	Ext ID1 slave 21 / 21A				Ext ID2 slave 21 / 21A			
54	ID_CODE slave 22 / 22A				I/O configuration slave 22 / 22A			
55	Ext ID1 slave 22 / 22A				Ext ID2 slave 22 / 22A			
56	ID_CODE slave 23 / 23A				I/O configuration slave 23 / 23A			
57	Ext ID1 slave 23 / 23A				Ext ID2 slave 23 / 23A			
58	ID_CODE slave 24 / 24A				I/O configuration slave 24 / 24A			
59	Ext ID1 slave 24 / 24A				Ext ID2 slave 24 / 24A			
60	ID_CODE slave 25 / 25A				I/O configuration slave 25 / 25A			
61	Ext ID1 slave 25 / 25A				Ext ID2 slave 25 / 25A			
62	ID_CODE slave 26 / 26A				I/O configuration slave 26 / 26A			
63	Ext ID1 slave 26 / 26A				Ext ID2 slave 26 / 26A			
64	ID_CODE slave 27 / 27A				I/O configuration slave 27 / 27A			
65	Ext ID1 slave 27 / 27A				Ext ID2 slave 27 / 27A			
66	ID_CODE slave 28 / 28A				I/O configuration slave 28 / 28A			
67	Ext ID1 slave 28 / 28A				Ext ID2 slave 28 / 28A			
68	ID_CODE slave 29 / 29A				I/O configuration slave 29 / 29A			
69	Ext ID1 slave 29 / 29A				Ext ID2 slave 29 / 29A			
70	ID_CODE slave 30 / 30A				I/O configuration slave 30 / 30A			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
71	Ext ID1 slave 30 / 30A				Ext ID2 slave 30 / 30A			
72	ID_CODE slave 31 / 31A				I/O configuration slave 31 / 31A			
73	Ext ID1 slave 31 / 31A				Ext ID2 slave 31 / 31A			
74	Reserved				Reserved			
75	Reserved				Reserved			
76	ID_CODE slave 1B				I/O configuration slave 1B			
77	Ext ID1 slave 1B				Ext ID2 slave 1B			
78	ID_CODE slave 2B				I/O configuration slave 2B			
79	Ext ID1 slave 2B				Ext ID2 slave 2B			
80	ID_CODE slave 3B				I/O configuration slave 3B			
81	Ext ID1 slave 3B				Ext ID2 slave 3B			
82	ID_CODE slave 4B				I/O configuration slave 4B			
83	Ext ID1 slave 4B				Ext ID2 slave 4B			
84	ID_CODE slave 5B				I/O configuration slave 5B			
85	Ext ID1 slave 5B				Ext ID2 slave 5B			
86	ID_CODE slave 6B				I/O configuration slave 6B			
87	Ext ID1 slave 6B				Ext ID2 slave 6B			
88	ID_CODE slave 7B				I/O configuration slave 7B			
89	Ext ID1 slave 7B				Ext ID2 slave 7B			
90	ID_CODE slave 8B				I/O configuration slave 8B			
91	Ext ID1 slave 8B				Ext ID2 slave 8B			
92	ID_CODE slave 9B				I/O configuration slave 9B			
93	Ext ID1 slave 9B				Ext ID2 slave 9B			
94	ID_CODE slave 10B				I/O configuration slave 10B			
95	Ext ID1 slave 10B				Ext ID2 slave 10B			
96	ID_CODE slave 11B				I/O configuration slave 11B			
97	Ext ID1 slave 11B				Ext ID2 slave 11B			
98	ID_CODE slave 12B				I/O configuration slave 12B			
99	Ext ID1 slave 12B				Ext ID2 slave 12B			
100	ID_CODE slave 13B				I/O configuration slave 13B			
101	Ext ID1 slave 13B				Ext ID2 slave 13B			
102	ID_CODE slave 14B				I/O configuration slave 14B			
103	Ext ID1 slave 14B				Ext ID2 slave 14B			
104	ID_CODE slave 15B				I/O configuration slave 15B			
105	Ext ID1 slave 15B				Ext ID2 slave 15B			
106	ID_CODE slave 16B				I/O configuration slave 16B			
107	Ext ID1 slave 16B				Ext ID2 slave 16B			
108	ID_CODE slave 17B				I/O configuration slave 17B			
109	Ext ID1 slave 17B				Ext ID2 slave 17B			
110	ID_CODE slave 18B				I/O configuration slave 18B			
111	Ext ID1 slave 18B				Ext ID2 slave 18B			
112	ID_CODE slave 19B				I/O configuration slave 19B			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
113	Ext ID1 slave 19B				Ext ID2 slave 19B			
114	ID_CODE slave 20B				I/O configuration slave 20B			
115	Ext ID1 slave 20B				Ext ID2 slave 20B			
116	ID_CODE slave 21B				I/O configuration slave 21B			
117	Ext ID1 slave 21B				Ext ID2 slave 21B			
118	ID_CODE slave 22B				I/O configuration slave 22B			
119	Ext ID1 slave 22B				Ext ID2 slave 22B			
120	ID_CODE slave 23B				I/O configuration slave 23B			
121	Ext ID1 slave 23B				Ext ID2 slave 23B			
122	ID_CODE slave 24B				I/O configuration slave 24B			
123	Ext ID1 slave 24B				Ext ID2 slave 24B			
124	ID_CODE slave 25B				I/O configuration slave 25B			
125	Ext ID1 slave 25B				Ext ID2 slave 25B			
126	ID_CODE slave 26B				I/O configuration slave 26B			
127	Ext ID1 slave 26B				Ext ID2 slave 26B			
128	ID_CODE slave 27B				I/O configuration slave 27B			
129	Ext ID1 slave 27B				Ext ID2 slave 27B			
130	ID_CODE slave 28B				I/O configuration slave 28B			
131	Ext ID1 slave 28B				Ext ID2 slave 28B			
132	ID_CODE slave 29B				I/O configuration slave 29B			
133	Ext ID1 slave 29B				Ext ID2 slave 29B			
134	ID_CODE slave 30B				I/O configuration slave 30B			
135	Ext ID1 slave 30B				Ext ID2 slave 30B			
136	ID_CODE slave 31B				I/O configuration slave 31B			
137	Ext ID1 slave 31B				Ext ID2 slave 31B			
138	Reserved				Parameter slave 1 / 1A			
139	Parameter slave 2 / 2A				Parameter slave 3 / 3A			
140	Parameter slave 4 / 4A				Parameter slave 5 / 5A			
141	Parameter slave 6 / 6A				Parameter slave 7 / 7A			
142	Parameter slave 8 / 8A				Parameter slave 9 / 9A			
143	Parameter slave 10 / 10A				Parameter slave 11 / 11A			
144	Parameter slave 12 / 12A				Parameter slave 13 / 13A			
145	Parameter slave 14 / 14A				Parameter slave 15 / 15A			
146	Parameter slave 16 / 16A				Parameter slave 17 / 17A			
147	Parameter slave 18 / 18A				Parameter slave 19 / 19A			
148	Parameter slave 20 / 20A				Parameter slave 21 / 21A			
149	Parameter slave 22 / 22A				Parameter slave 23 / 23A			
150	Parameter slave 24 / 24A				Parameter slave 25 / 25A			
151	Parameter slave 26 / 26A				Parameter slave 27 / 27A			
152	Parameter slave 28 / 28A				Parameter slave 29 / 29A			
153	Parameter slave 30 / 30A				Parameter slave 31 / 31A			
154	Reserved				Parameter slave 1B			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
155	Parameter slave 2B				Parameter slave 3B			
156	Parameter slave 4B				Parameter slave 5B			
157	Parameter slave 6B				Parameter slave 7B			
158	Parameter slave 8B				Parameter slave 9B			
159	Parameter slave 10B				Parameter slave 11B			
160	Parameter slave 12B				Parameter slave 13B			
161	Parameter slave 14B				Parameter slave 15B			
162	Parameter slave 16B				Parameter slave 17B			
163	Parameter slave 18B				Parameter slave 19B			
164	Parameter slave 20B				Parameter slave 21B			
165	Parameter slave 22B				Parameter slave 23B			
166	Parameter slave 24B				Parameter slave 25B			
167	Parameter slave 26B				Parameter slave 27B			
168	Parameter slave 28B				Parameter slave 29B			
169	Parameter slave 30B				Parameter slave 31B			
170	Flag 1							
171	Flag 2							
172	Reserved							
...	...							
218	Reserved							

Table 7-39 Description of the flag contents of flag 1

Bit	Meaning	Description
0	OFFLINE_READY	The flag is set if the offline phase is active.
1	APF	The flag is set if the voltage on the AS-i cable is too low.
2	NORMAL_MODE	The flag is set when the DP / AS-i F-Link is in normal mode.
3	OPERATING MODE	The flag is set in configuring mode and reset in protected mode.
4	AUTO_ADDR_AVAIL	The flag is set if automatic address programming can be carried out (i.e. precisely **one** AS-i slave has currently failed).
5	AUTO_ADDR_ASSIGN	The flag is set if automatic address programming is possible (that is, AUTO_ADDR_ENABLE = 1 **and** no "incorrect" AS-i slave is connected to the AS-Interface).
6	LDS_0	The flag is set if an AS-i slave with operating address "0" is available.
7	CONFIG_OK	The flag is set when the planned configuration and the actual configuration agree.

Table 7-40 Description of the flag contents of flag 2

Bit	Meaning	Description
0	OFFLINE	The flag is set if the operating status "OFFLINE" is to be adopted or has already been adopted.
1	INTERNAL	The flag is always set.
2	EEPROM_OK	The flag is set if the test of the internal EEPROM was successful.
3	AUTO_ADDR_ENABLE	The flag indicates whether automatic address programming by the user is disabled (BIT = 0) or enabled (BIT = 1).
4	PERIPHERY_FAULT	The flag is set if at least one AS-i slave signals an I/O fault.
5	Reserved	-
6	Reserved	-
7	MPO startup	The flag "Master_Power_on-startup" is set after the supply voltage of the AS-i slave master has been switched on. The bit is reset when the master changes later to OFFLINE.

7.3.22 Configure_Overall_Configuration

With this call, the desired overall configuration of the AS-Interface is transferred to the AS-i master and stored in non-volatile EEPROM as the desired configuration. The DP / AS-i F-Link is configured by this.

Specifically, the following data are transferred:

- The list of configured AS-i slaves. This defines which AS-i slaves may be activated by the AS-i master in protected mode
- The list of configuration data. This specifies which ID codes and which I/O configuration the connected AS-i slaves must have
- The list of the AS-i slave parameters that have been configured in the AS-i master and stored in non-volatile memory. These parameters are transferred to the AS-i slaves when the AS-i master starts up
- The flags that determine the operating state of the AS-i master after startup

This call is **not**executed in protected mode.

For AS-i slaves that meet standard profile 7.4, the AS-i master itself administers the parameterization. The AS-i master ignores the parameter values for slaves to standard profile 7.4 specified in the call.

Note

This command is not required when using a failsafe SIMATIC S7

If you use a failsafe SIMATIC S7 as the PROFIBUS DP master, this sends a complete AS-i slave configuration to the DP / AS-i F-Link, if necessary, during PROFIBUS DP startup, depending on the STEP 7 configuration. Use of the call described here is then usually superfluous.

Table 7-41 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $3A_H$							
1	00_H							
2	Irrelevant	LPS slave 1 / 1A	LPS slave 2 / 2A	LPS slave 3 / 3A	LPS slave 4 / 4A	LPS slave 5 / 5A	LPS slave 6 / 6A	LPS slave 7 / 7A
3	LPS slave 8 / 8A	LPS slave 9 / 9A	LPS slave 10 / 10A	LPS slave 11 / 11A	LPS slave 12 / 12A	LPS slave 13 / 13A	LPS slave 14 / 14A	LPS slave 15 / 15A
4	LPS slave 16 / 16A	LPS slave 17 / 17A	LPS slave 18 / 18A	LPS slave 19 / 19A	LPS slave 20 / 20A	LPS slave 21 / 21A	LPS slave 22 / 22A	LPS slave 23 / 23A
5	LPS slave 24 / 24A	LPS slave 25 / 25A	LPS slave 26 / 26A	LPS slave 27 / 27A	LPS slave 28 / 28A	LPS slave 29 / 29A	LPS slave 30 / 30A	LPS slave 31 / 31A
6	Irrelevant	LPS slave 1B	LPS slave 2B	LPS slave 3B	LPS slave 4B	LPS slave 5B	LPS slave 6B	LPS slave 7B
7	LPS slave 8B	LPS slave 9B	LPS slave 10B	LPS slave 11B	LPS slave 12B	LPS slave 13B	LPS slave 14B	LPS slave 15B
8	LPS slave 16B	LPS slave 17B	LPS slave 18B	LPS slave 19B	LPS slave 20B	LPS slave 21B	LPS slave 22B	LPS slave 23B
9	LPS slave 24B	LPS slave 25B	LPS slave 26B	LPS slave 27B	LPS slave 28B	LPS slave 29B	LPS slave 30B	LPS slave 31B
10	Irrelevant				Irrelevant			
11	Irrelevant				Irrelevant			
12	ID_CODE slave 1 / 1A				I/O configuration slave 1 / 1A			
13	Ext ID1 slave 1 / 1A				Ext ID2 slave 1 / 1A			
14	ID_CODE slave 2 / 2A				I/O configuration slave 2 / 2A			
15	Ext ID1 slave 2 / 2A				Ext ID2 slave 2 / 2A			
16	ID_CODE slave 3 / 3A				I/O configuration slave 3 / 3A			
17	Ext ID1 slave 3 / 3A				Ext ID2 slave 3 / 3A			
18	ID_CODE slave 4 / 4A				I/O configuration slave 4 / 4A			
19	Ext ID1 slave 4 / 4A				Ext ID2 slave 4 / 4A			
20	ID_CODE slave 5 / 5A				I/O configuration slave 5 / 5A			
21	Ext ID1 slave 5 / 5A				Ext ID2 slave 5 / 5A			
22	ID_CODE slave 6 / 6A				I/O configuration slave 6 / 6A			
23	Ext ID1 slave 6 / 6A				Ext ID2 slave 6 / 6A			
24	ID_CODE slave 7 / 7A				I/O configuration slave 7 / 7A			
25	Ext ID1 slave 7 / 7A				Ext ID2 slave 7 / 7A			
26	ID_CODE slave 8 / 8A				I/O configuration slave 8 / 8A			
27	Ext ID1 slave 8 / 8A				Ext ID2 slave 8 / 8A			
28	ID_CODE slave 9 / 9A				I/O configuration slave 9 / 9A			
29	Ext ID1 slave 9 / 9A				Ext ID2 slave 9 / 9A			
30	ID_CODE slave 10 / 10A				I/O configuration slave 10 / 10A			
31	Ext ID1 slave 10 / 10A				Ext ID2 slave 10 / 10A			
32	ID_CODE slave 11 / 11A				I/O configuration slave 11 / 11A			
33	Ext ID1 slave 11 / 11A				Ext ID2 slave 11 / 11A			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
34	ID_CODE slave 12 / 12A				I/O configuration slave 12 / 12A			
35	Ext ID1 slave 12 / 12A				Ext ID2 slave 12 / 12A			
36	ID_CODE slave 13 / 13A				I/O configuration slave 13 / 13A			
37	Ext ID1 slave 13 / 13A				Ext ID2 slave 13 / 13A			
38	ID_CODE slave 14 / 14A				I/O configuration slave 14 / 14A			
39	Ext ID1 slave 14 / 14A				Ext ID2 slave 14 / 14A			
40	ID_CODE slave 15 / 15A				I/O configuration slave 15 / 15A			
41	Ext ID1 slave 15 / 15A				Ext ID2 slave 15 / 15A			
42	ID_CODE slave 16 / 16A				I/O configuration slave 16 / 16A			
43	Ext ID1 slave 16 / 16A				Ext ID2 slave 16 / 16A			
44	ID_CODE slave 17 / 17A				I/O configuration slave 17 / 17A			
45	Ext ID1 slave 17 / 17A				Ext ID2 slave 17 / 17A			
46	ID_CODE slave 18 / 18A				I/O configuration slave 18 / 18A			
47	Ext ID1 slave 18 / 18A				Ext ID2 slave 18 / 18A			
48	ID_CODE slave 19 / 19A				I/O configuration slave 19 / 19A			
49	Ext ID1 slave 19 / 19A				Ext ID2 slave 19 / 19A			
50	ID_CODE slave 20 / 20A				I/O configuration slave 20 / 20A			
51	Ext ID1 slave 20 / 20A				Ext ID2 slave 20 / 20A			
52	ID_CODE slave 21 / 21A				I/O configuration slave 21 / 21A			
53	Ext ID1 slave 21 / 21A				Ext ID2 slave 21 / 21A			
54	ID_CODE slave 22 / 22A				I/O configuration slave 22 / 22A			
55	Ext ID1 slave 22 / 22A				Ext ID2 slave 22 / 22A			
56	ID_CODE slave 23 / 23A				I/O configuration slave 23 / 23A			
57	Ext ID1 slave 23 / 23A				Ext ID2 slave 23 / 23A			
58	ID_CODE slave 24 / 24A				I/O configuration slave 24 / 24A			
59	Ext ID1 slave 24 / 24A				Ext ID2 slave 24 / 24A			
60	ID_CODE slave 25 / 25A				I/O configuration slave 25 / 25A			
61	Ext ID1 slave 25 / 25A				Ext ID2 slave 25 / 25A			
62	ID_CODE slave 26 / 26A				I/O configuration slave 26 / 26A			
63	Ext ID1 slave 26 / 26A				Ext ID2 slave 26 / 26A			
64	ID_CODE slave 27 / 27A				I/O configuration slave 27 / 27A			
65	Ext ID1 slave 27 / 27A				Ext ID2 slave 27 / 27A			
66	ID_CODE slave 28 / 28A				I/O configuration slave 28 / 28A			
67	Ext ID1 slave 28 / 28A				Ext ID2 slave 28 / 28A			
68	ID_CODE slave 29 / 29A				I/O configuration slave 29 / 29A			
69	Ext ID1 slave 29 / 29A				Ext ID2 slave 29 / 29A			
70	ID_CODE slave 30 / 30A				I/O configuration slave 30 / 30A			
71	Ext ID1 slave 30 / 30A				Ext ID2 slave 30 / 30A			
72	ID_CODE slave 31 / 31A				I/O configuration slave 31 / 31A			
73	Ext ID1 slave 31 / 31A				Ext ID2 slave 31 / 31A			
74	Irrelevant				Irrelevant			
75	Irrelevant				Irrelevant			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
76	ID_CODE slave 1B				I/O configuration slave 1B			
77	Ext ID1 slave 1B				Ext ID2 slave 1B			
78	ID_CODE slave 2B				I/O configuration slave 2B			
79	Ext ID1 slave 2B				Ext ID2 slave 2B			
80	ID_CODE slave 3B				I/O configuration slave 3B			
81	Ext ID1 slave 3B				Ext ID2 slave 3B			
82	ID_CODE slave 4B				I/O configuration slave 4B			
83	Ext ID1 slave 4B				Ext ID2 slave 4B			
84	ID_CODE slave 5B				I/O configuration slave 5B			
85	Ext ID1 slave 5B				Ext ID2 slave 5B			
86	ID_CODE slave 6B				I/O configuration slave 6B			
87	Ext ID1 slave 6B				Ext ID2 slave 6B			
88	ID_CODE slave 7B				I/O configuration slave 7B			
89	Ext ID1 slave 7B				Ext ID2 slave 7B			
90	ID_CODE slave 8B				I/O configuration slave 8B			
91	Ext ID1 slave 8B				Ext ID2 slave 8B			
92	ID_CODE slave 9B				I/O configuration slave 9B			
93	Ext ID1 slave 9B				Ext ID2 slave 9B			
94	ID_CODE slave 10B				I/O configuration slave 10B			
95	Ext ID1 slave 10B				Ext ID2 slave 10B			
96	ID_CODE slave 11B				I/O configuration slave 11B			
97	Ext ID1 slave 11B				Ext ID2 slave 11B			
98	ID_CODE slave 12B				I/O configuration slave 12B			
99	Ext ID1 slave 12B				Ext ID2 slave 12B			
100	ID_CODE slave 13B				I/O configuration slave 13B			
101	Ext ID1 slave 13B				Ext ID2 slave 13B			
102	ID_CODE slave 14B				I/O configuration slave 14B			
103	Ext ID1 slave 14B				Ext ID2 slave 14B			
104	ID_CODE slave 15B				I/O configuration slave 15B			
105	Ext ID1 slave 15B				Ext ID2 slave 15B			
106	ID_CODE slave 16B				I/O configuration slave 16B			
107	Ext ID1 slave 16B				Ext ID2 slave 16B			
108	ID_CODE slave 17B				I/O configuration slave 17B			
109	Ext ID1 slave 17B				Ext ID2 slave 17B			
110	ID_CODE slave 18B				I/O configuration slave 18B			
111	Ext ID1 slave 18B				Ext ID2 slave 18B			
112	ID_CODE slave 19B				I/O configuration slave 19B			
113	Ext ID1 slave 19B				Ext ID2 slave 19B			
114	ID_CODE slave 20B				I/O configuration slave 20B			
115	Ext ID1 slave 20B				Ext ID2 slave 20B			
116	ID_CODE slave 21B				I/O configuration slave 21B			
117	Ext ID1 slave 21B				Ext ID2 slave 21B			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
118	ID_CODE slave 22B				I/O configuration slave 22B			
119	Ext ID1 slave 22B				Ext ID2 slave 22B			
120	ID_CODE slave 23B				I/O configuration slave 23B			
121	Ext ID1 slave 23B				Ext ID2 slave 23B			
122	ID_CODE slave 24B				I/O configuration slave 24B			
123	Ext ID1 slave 24B				Ext ID2 slave 24B			
124	ID_CODE slave 25B				I/O configuration slave 25B			
125	Ext ID1 slave 25B				Ext ID2 slave 25B			
126	ID_CODE slave 26B				I/O configuration slave 26B			
127	Ext ID1 slave 26B				Ext ID2 slave 26B			
128	ID_CODE slave 27B				I/O configuration slave 27B			
129	Ext ID1 slave 27B				Ext ID2 slave 27B			
130	ID_CODE slave 28B				I/O configuration slave 28B			
131	Ext ID1 slave 28B				Ext ID2 slave 28B			
132	ID_CODE slave 29B				I/O configuration slave 29B			
133	Ext ID1 slave 29B				Ext ID2 slave 29B			
134	ID_CODE slave 30B				I/O configuration slave 30B			
135	Ext ID1 slave 30B				Ext ID2 slave 30B			
136	ID_CODE slave 31B				I/O configuration slave 31B			
137	Ext ID1 slave 31B				Ext ID2 slave 31B			
138	Irrelevant				Parameter slave 1 / 1A			
139	Parameter slave 2 / 2A				Parameter slave 3 / 3A			
140	Parameter slave 4 / 4A				Parameter slave 5 / 5A			
141	Parameter slave 6 / 6A				Parameter slave 7 / 7A			
142	Parameter slave 8 / 8A				Parameter slave 9 / 9A			
143	Parameter slave 10 / 10A				Parameter slave 11 / 11A			
144	Parameter slave 12 / 12A				Parameter slave 13 / 13A			
145	Parameter slave 14 / 14A				Parameter slave 15 / 15A			
146	Parameter slave 16 / 16A				Parameter slave 17 / 17A			
147	Parameter slave 18 / 18A				Parameter slave 19 / 19A			
148	Parameter slave 20 / 20A				Parameter slave 21 / 21A			
149	Parameter slave 22 / 22A				Parameter slave 23 / 23A			
150	Parameter slave 24 / 24A				Parameter slave 25 / 25A			
151	Parameter slave 26 / 26A				Parameter slave 27 / 27A			
152	Parameter slave 28 / 28A				Parameter slave 29 / 29A			
153	Parameter slave 30 / 30A				Parameter slave 31 / 31A			
154	Irrelevant				Parameter slave 1B			
155	Parameter slave 2B				Parameter slave 3B			
156	Parameter slave 4B				Parameter slave 5B			
157	Parameter slave 6B				Parameter slave 7B			
158	Parameter slave 8B				Parameter slave 9B			
159	Parameter slave 10B				Parameter slave 11B			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
160	Parameter slave 12B				Parameter slave 13B			
161	Parameter slave 14B				Parameter slave 15B			
162	Parameter slave 16B				Parameter slave 17B			
163	Parameter slave 18B				Parameter slave 19B			
164	Parameter slave 20B				Parameter slave 21B			
165	Parameter slave 22B				Parameter slave 23B			
166	Parameter slave 24B				Parameter slave 25B			
167	Parameter slave 26B				Parameter slave 27B			
168	Parameter slave 28B				Parameter slave 29B			
169	Parameter slave 30B				Parameter slave 31B			
170	Flag 1							
171	Flag 2							

Table 7-42 Description of the flag contents of flag 1

Bit	Meaning	Description
0	OFFLINE_READY	Irrelevant
1	APF	Irrelevant
2	NORMAL_MODE	Irrelevant
3	OPERATING MODE	0: The AS-i master powers up in protected mode after completion of the job 1: The AS-i master powers up in config mode after completion of the job
4	AUTO_ADDR_AVAIL	Irrelevant
5	AUTO_ADDR_ASSIGN	Irrelevant
6	LDS_0	Irrelevant
7	CONFIG_OK	Irrelevant

Table 7-43 Description of the flag contents of flag 2

Bit	Meaning	Description
0	OFFLINE	Irrelevant
1	INTERNAL	Irrelevant
2	EEPROM_OK	Irrelevant
3	AUTO_ADDR_ENABLE	0: Automatic address programming disabled 1: Automatic address programming enabled
4	PERIPHERY_FAULT	Irrelevant
5	Reserved	Irrelevant
6	Reserved	Irrelevant
7	MPO startup	Irrelevant

Only those flags whose values modify the operating mode of the AS-i master are relevant. The values of the remaining flags are insignificant for the command "Configure_Overall_Configuration" and cannot be modified in the AS-i master by this call.

7.3.23 Write_Extended_Parameter_List

Parameters for all AS-i slaves are transferred to the AS-i master with this command. It transfers **only the parameters that have changed** to the AS-i slaves. These are the parameters that deviate from the previously sent (actual) parameters.

Table 7-44 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $3C_H$							
1	00_H							
2	Irrelevant				Parameter slave 1 / 1A			
3	Parameter slave 2 / 2A				Parameter slave 3 / 3A			
4	Parameter slave 4 / 4A				Parameter slave 5 / 5A			
5	Parameter slave 6 / 6A				Parameter slave 7 / 7A			
6	Parameter slave 8 / 8A				Parameter slave 9 / 9A			
7	Parameter slave 10 / 10A				Parameter slave 11 / 11A			
8	Parameter slave 12 / 12A				Parameter slave 13 / 13A			
9	Parameter slave 14 / 14A				Parameter slave 15 / 15A			
10	Parameter slave 16 / 16A				Parameter slave 17 / 17A			
11	Parameter slave 18 / 18A				Parameter slave 19 / 19A			
12	Parameter slave 20 / 20A				Parameter slave 21 / 21A			
13	Parameter slave 22 / 22A				Parameter slave 23 / 23A			
14	Parameter slave 24 / 24A				Parameter slave 25 / 25A			
15	Parameter slave 26 / 26A				Parameter slave 27 / 27A			
16	Parameter slave 28 / 28A				Parameter slave 29 / 29A			
17	Parameter slave 30 / 30A				Parameter slave 31 / 31A			
18	Irrelevant				Parameter slave 1B			
19	Parameter slave 2B				Parameter slave 3B			
20	Parameter slave 4B				Parameter slave 5B			
21	Parameter slave 6B				Parameter slave 7B			
22	Parameter slave 8B				Parameter slave 9B			
23	Parameter slave 10B				Parameter slave 11B			
24	Parameter slave 12B				Parameter slave 13B			
25	Parameter slave 14B				Parameter slave 15B			
26	Parameter slave 16B				Parameter slave 17B			
27	Parameter slave 18B				Parameter slave 19B			
28	Parameter slave 20B				Parameter slave 21B			
29	Parameter slave 22B				Parameter slave 23B			
30	Parameter slave 24B				Parameter slave 25B			
31	Parameter slave 26B				Parameter slave 27B			
32	Parameter slave 28B				Parameter slave 29B			
33	Parameter slave 30B				Parameter slave 31B			

7.3.24 Read_Extended_Parameter_Echo_List

The echo values of all AS-i slaves are returned with the call "Read_Extended_Parameter_Echo_List". The echo values of an AS-i slave originate in the last parameter call sent to this AS-i slave.

Table 7-45 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 33_H							
1	00_H							

Table 7-46 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Irrelevant				Parameter echo slave 1 / 1A			
1	Parameter echo slave 2 / 2A				Parameter echo slave 3 / 3A			
2	Parameter echo slave 4 / 4A				Parameter echo slave 5 / 5A			
3	Parameter echo slave 6 / 6A				Parameter echo slave 7 / 7A			
4	Parameter echo slave 8 / 8A				Parameter echo slave 9 / 9A			
5	Parameter echo slave 10 / 10A				Parameter echo slave 11 / 11A			
6	Parameter echo slave 12 / 12A				Parameter echo slave 13 / 13A			
7	Parameter echo slave 14 / 14A				Parameter echo slave 15 / 15A			
8	Parameter echo slave 16 / 16A				Parameter echo slave 17 / 17A			
9	Parameter echo slave 18 / 18A				Parameter echo slave 19 / 19A			
10	Parameter echo slave 20 / 20A				Parameter echo slave 21 / 21A			
11	Parameter echo slave 22 / 22A				Parameter echo slave 23 / 23A			
12	Parameter echo slave 24 / 24A				Parameter echo slave 25 / 25A			
13	Parameter echo slave 26 / 26A				Parameter echo slave 27 / 27A			
14	Parameter echo slave 28 / 28A				Parameter echo slave 29 / 29A			
15	Parameter echo slave 30 / 30A				Parameter echo slave 31 / 31A			
16	Irrelevant				Parameterecho slave 1B			
17	Parameterecho slave 2B				Parameterecho slave 3B			
18	Parameterecho slave 4B				Parameterecho slave 5B			
19	Parameterecho slave 6B				Parameterecho slave 7B			
20	Parameterecho slave 8B				Parameterecho slave 9B			
21	Parameterecho slave 10B				Parameterecho slave 11B			
22	Parameterecho slave 12B				Parameterecho slave 13B			
23	Parameterecho slave 14B				Parameterecho slave 15B			
24	Parameterecho slave 16B				Parameterecho slave 17B			
25	Parameterecho slave 18B				Parameterecho slave 19B			
26	Parameterecho slave 20B				Parameterecho slave 21B			
27	Parameterecho slave 22B				Parameterecho slave 23B			
28	Parameterecho slave 24B				Parameterecho slave 25B			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
29	Parameterecho slave 26B				Parameterecho slave 27B			
30	Parameterecho slave 28B				Parameterecho slave 29B			
31	Parameterecho slave 30B				Parameterecho slave 31B			

7.3.25 Read_Version_ID

The version ID of the firmware of the DP / AS-i F-Link is read out with this call.

Table 7-47 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 14_H							

The reply of the DP / AS-i F-Link contains the name and the firmware version number in the form shown below:

Table 7-48 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	I							
1	i							
2	e							
3	m							
4	e							
5	n							
6	s							
7	"Blank" 20_H							
8	A							
9	G							
10	"Blank" 20_H							
11	F							
12	L							
13	I							
14	N							
15	K							
16	"Blank" 20_H							
17	E							
18	0							
19	1							
20	0							
21	"Blank" 20_H							
22	"Blank" 20_H							

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
23	"Blank" 20_H							
24	"Blank" 20_H							
25	"Blank" 20_H							
26	"Blank" 20_H							
27	"Blank" 20_H							
28	"Blank" 20_H							
29	"Blank" 20_H							
30	"Blank" 20_H							
31	"Blank" 20_H							

7.3.26 Read_AS-i-Slave_ID

The ID code of an AS-i slave can be read out direct via the AS-Interface with this call.

The call is intended for diagnostics purposes and is not required in normal master mode.

Table 7-49 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 17_H							
1	Slave address							

Table 7-50 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved				ID code			

7.3.27 Read_AS-i-Slave_Extended-ID1

The extended ID1 code of an AS-i slave can be read out direct via the AS-Interface with this call.

The call is intended for diagnostics purposes and is not required in normal master mode.

Table 7-51 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 37_H							
1	Slave address							

Table 7-52 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved				Extended ID1 code			

7.3.28 Write_AS-i-Slave_Extended-ID1

The extended ID1 code of an AS-i slave with the address "0" can be written to direct via the AS-Interface with this call.

The call is intended for diagnostics purposes and is not required in normal master mode. The AS-i master forwards the extended ID1 code to the AS-i slave without validity check.

Table 7-53 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $3F_H$							
1	Irrelevant				Extended ID1 code			

7.3.29 Read_AS-i-Slave_Extended-ID2

The extended ID2 code of an AS-i slave can be read out direct via the AS-Interface with this call.

The call is intended for diagnostics purposes and is not required in normal master mode.

Table 7-54 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 38_H							
1	Slave address							

Table 7-55 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved				Extended ID2 code			

7.3.30 Read_AS-i-Slave_I/O

The I/O configuration of an AS-i slave can be read out direct via the AS-Interface with this call.

The call is intended for diagnostics purposes and is not required in normal master mode.

Table 7-56 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 18_H							
1	Slave address							

Table 7-57 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved				I/O configuration			

7.3.31 Get_LPF

The list of I/O faults (periphery faults) (LPF) signaled by the AS-i slaves are read out from the AS-i master with this call.

The LPF is updated cyclically by the AS-i master. Refer to the description of the AS-i slave to learn whether the slave can detect a fault in the connected I/O (e.g. wirebreak) and when it signals the fault.

Table 7-58 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: $3E_H$							

Table 7-59 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	LPF slave 0	LPF slave 1 / 1A	LPF slave 2 / 2A	LPF slave 3 / 3A	LPF slave 4 / 4A	LPF slave 5 / 5A	LPF slave 6 / 6A	LPF slave 7 / 7A
1	LPF slave 8 / 8A	LPF slave 9 / 9A	LPF slave 10 / 10A	LPF slave 11 / 11A	LPF slave 12 / 12A	LPF slave 13 / 13A	LPF slave 14 / 14A	LPF slave 15 / 15A
2	LPF slave 16 / 16A	LPF slave 17 / 17A	LPF slave 18 / 18A	LPF slave 19 / 19A	LPF slave 20 / 20A	LPF slave 21 / 21A	LPF slave 22 / 22A	LPF slave 23 / 23A
3	LPF slave 24 / 24A	LPF slave 25 / 25A	LPF slave 26 / 26A	LPF slave 27 / 27A	LPF slave 28 / 28A	LPF slave 29 / 29A	LPF slave 30 / 30A	LPF slave 31 / 31A
4	Reserved	LPF slave 1B	LPF slave 2B	LPF slave 3B	LPF slave 4B	LPF slave 5B	LPF slave 6B	LPF slave 7B

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
5	LPF slave 8B	LPF slave 9B	LPF slave 10B	LPF slave 11B	LPF slave 12B	LPF slave 13B	LPF slave 14B	LPF slave 15B
6	LPF slave 16B	LPF slave 17B	LPF slave 18B	LPF slave 19B	LPF slave 20B	LPF slave 21B	LPF slave 22B	LPF slave 23B
7	LPF slave 24B	LPF slave 25B	LPF slave 26B	LPF slave 27B	LPF slave 28B	LPF slave 29B	LPF slave 30B	LPF slave 31B
8	Reserved							
9	Reserved							
10	Reserved							
11	Reserved							
12	Reserved							
13	Reserved							

Meaning of the bits of Byte 0 to Byte 7:

- Bit = 0: The AS-i slave signals no I/O fault
- Bit = 1: The AS-i slave signals I/O faults

7.3.32 Write_AS-i-Slave_Parameter-string

A parameter string to AS-i slave profile 7.4 can be sent to the AS-i master with this call. The master forwards the parameter string to the slave address specified in the send buffer.

A send buffer with up to 223 bytes is transferred to the AS-i master with this call. The AS-i master calculates the actual number of parameter bytes to be sent to the AS-i slave from byte 2 of the send buffer (number of parameter bytes).

The other information in the parameter string is not evaluated by the AS-i master and is forwarded transparently to the AS-i slave. While transmission of the string is running, there is no transfer of user data/analog data with the addressed AS-i slave.

Table 7-60 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 40_H							
1	Slave address							
2	Number of parameter bytes							
3	String byte 1							
4	String byte 2							
...	...							
...	String byte n-1							
...	String byte n							

Maximum value for n = 220

7.3.33 Read_AS-i-Slave_Parameter-string

With this call, a parameter string to AS-i slave profile 7.4 can be read by the AS-i slave with the slave address specified in the send buffer.

The AS-i master supplies up to 221 bytes of reply data. AS-i master signals the actual number of parameter bytes sent by the AS-i slave in Byte 0 of the receive buffer (number of parameter bytes).
If the AS-i slave sends a string longer than 220 bytes, the AS-i master aborts the string transfer and terminates the job with an error. The received data are not made available to the user program.
While transmission of the string is running, there is no transfer of user data/analog data with the addressed AS-i slave.

Table 7-61 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 41_H							
1	Slave address							

Table 7-62 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Number of parameter bytes							
1	String byte 1							
2	String byte 2							
...	...							
...	String byte n-1							
...	String byte n							

Maximum value for n = 220

7.3.34 Read_AS-i-Slave_ID-string

With this call, an identification string to AS-i slave profile 7.4 can be read by the AS-i slave with the slave address specified in the send buffer.

The AS-i master supplies up to 221 bytes of reply data. The AS-i master signals the actual number of ID bytes sent by the AS-i slave in Byte 0 of the receive buffer (number of ID bytes). If the AS-i slave sends a string longer than 220 bytes, the AS-i master aborts string transfer and terminates the job with an error. The received data are not made available to the user program.

While transmission of the string is running, there is no transfer of user data/analog data with the addressed AS-i slave.

Note

Additional transfer of the information "Follows" and "Valid"

The bytes containing the bits "Follows" and "Valid" are transferred as an exception with this call (see AS-i slave profile 7.4)

Table 7-63 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 42_H							
1	Slave address							

Table 7-64 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Number of ID bytes							
1	String byte 1							
2	String byte 2							
...	...							
...	String byte n-1							
...	String byte n							

Maximum value for n = 220

7.3.35 Read_AS-i-Slave_Diagnostics-string

With this call, a diagnostics string to AS-i slave profile 7.4 can be read by the AS-i slave with the slave address specified in the send buffer.

The AS-i master supplies up to 221 bytes of reply data. The AS-i master signals the actual number of diagnostics bytes sent by the AS-i slave in Byte 0 of the receive buffer (number of diagnostics bytes).
If the AS-i slave sends a string longer than 220 bytes, the AS-i master aborts the string transfer and terminates the job with an error. The received data are not made available to the user program.
While transmission of the string is running, there is no transfer of user data/analog data with the addressed AS-i slave.

Table 7-65 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 43_H							
1	Slave address							

Table 7-66 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Number of diagnostics bytes							
1	String byte 1							
2	String byte 2							
...	...							
...	String byte n-1							
...	String byte n							

Maximum value for n = 220

7.3.36 AS-i_Status/Diag_of_the_F_Slaves

The status and diagnostics of the AS-i master and the ASIsafe slaves on the AS-Interface are read with this command.
The AS-i master supplies 221 bytes of reply data.

Table 7-67 Structure of the job data in the send buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number: 51_H							

Table 7-68 Structure of the reply data in the receive buffer

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved	Reserved	0 = teaching of code sequences not required 1 = teaching required	00 = No code sequences taught 01 = Code sequences taught 10 = Code sequences taught and others available for teaching 11 = All code sequences taught		0 = Master not protected mode 1 = Master protected mode	0 = Master offline 1 = Master online	0 = teaching not active 1 = teaching active
1	Reserved							
2	Reserved							
3	Reserved							
4	Slave 1 / 1A diagnostics byte 1							
5	Slave 1 / 1A diagnostics byte 2							
6	Slave 2 / 2A diagnostics byte 1							
7	Slave 2 / 2A diagnostics byte 2							
...	...							
64	Slave 31 / 31A diagnostics byte 1							
65	Slave 31 / 31A diagnostics byte 2							

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
66	Reserved							
67	Reserved							
68	Slave 1B diagnostics byte 1							
69	Slave 1B diagnostics byte 2							
...	...							
128	Slave 31B diagnostics byte 1							
129	Slave 31B diagnostics byte 2							
130	Flag 1							
131	Flag 2							
132	Reserved							
...	...							
220	Reserved							

Table 7-69 Coding of diagnostics byte 1 and diagnostics byte 2

Bit	Diagnostic byte 1	Diagnostic byte 2
0	1 = I/O fault	1 = F-DI 1 closed
1	1 = Slave active	1 = F-DI 2 closed
2	1 = Slave is F slave	1 = Discrepancy violation
3	1 = Code sequence error during operation	1 = Power up condition not met
4	1 = Error in code sequence during teaching	1 = Planned <> Actual
5	1 = Code sequence not unique	Reserved
6	1 = No code sequence taught	Reserved
7	Reserved	Reserved

Service/diagnostics/remedies

8

This chapter provides you with information on diagnostics methods and measures for correcting faults:

- Error messages via:
  - Indicator LEDs
  - The display
  - The diagnostic message frame (DP slave diagnostics)
- Calling data records for diagnostics purposes
- Replacing hardware
  - Replacing an AS-i slave with the help of automatic address programming
  - Replacing several AS-i slaves
  - Removing ASIsafe slaves
  - Replacing the DP / AS-i F-Link

8.1 Diagnostics via indicator LEDs and remedial measures

8.1.1 Overview of indicator LEDs

The DP / AS-i F-Link has the following four indicator LEDs:

Table 8-1 Overview of indicator LEDs

Part of the front elevation	Name	Meaning
	DEVICE	Status
	ASi	AS-i voltage/status
	BF	Bus fault (PROFIBUS DP)
	SF	Group errors

At restart, the device carries out a self-test of the indicator LEDs:

- All LEDs light up for 3 s
- The two-color DEVICE and ASi-LEDs show yellow light

Note

The device is defective if the LEDs do not light up despite power supply

If neither the LEDs nor the display light up when the supply voltage and the AS-i voltage are on, the device is defective.

8.1.2 Fault and status indicators of the DEVICE LED and remedial measures

Table 8-2 Fault and status indicators of the DEVICE LED and remedial measures

Display	Possible cause	Possible remedial measures
off	24 V DC power supply missing	Check the 24 V DC power supply of the DP / AS-i F-Link
Green	Device OK	-
Flashing green	Device in power up (self-test, configuratioon and teaching of code sequences)	-
Yellow	PROFIsafe address invalid or incorrect	Enter the correct PROFIsafe address of the DP / AS-i F-Link via the operator menu of the display
Flashing yellow	Factory settings not yet complete	Switch the 24 V DC power supply of the DP / AS-i F-Link off and on again
Flickering yellow	Procedure for making factory settings	-
Red	Device defective	Replace the defective DP / AS-i F-Link
Flashing red/green	Device defective	Replace the defective DP / AS-i F-Link
Flickering red	Procedure for making factory settings	-

See also

Replacing the DP / AS-i F-Link (Page 8-17)

8.1.3 Fault and status indicators of the ASi LED and remedial measures

Table 8-3 Fault and status indicators of the ASi LED and remedial measures

Display	Possible cause	Possible remedial measures
off	AS-i voltage too low or failed	Check the power supply of the AS-i slaves
Green	Device is in "Protected mode"	-
Flashing green	AS-i configuration error	Configure the AS-i slave specified in the display again
Yellow	Device is in "Config" mode	-
Red	No AS-i slave connected to the AS-Interface	Connect an AS-i slave to the AS-Interface This display does not appear in "Config" mode (ASi-LED yellow)

8.1.4 Fault and status indicators of the BF LED and remedial measures

Table 8-4 Fault and status indicators of the BF LED and remedial measures

Display	Possible cause	Possible remedial measures
off	PROFIBUS DP OK	-
Red	PROFIBUS DP connector not plugged in during power up	Plug in the PROFIBUS DP connector during power up
Flashing red	PROFIBUS DP parameterization/configuration error	• Check the PROFIBUS DP connectors and terminating resistors • Configure the PROFIBUS DP node specified in the display again

8.1.5 Fault and status indicators of the SF LED and remedial measures

Table 8-5 Fault and status indicators of the SF LED and remedial measures

Display	Possible cause	Possible remedial measures
off	No group fault	-
Red	Group fault, including the AS-i slaves	Read out data record 92

8.2 Diagnostics via the display and remedial measures

8.2.1 Fault and status messages of the display in status mode

Notice

Incoming status and diagnostics messages only in status mode

The display can only show incoming fault and diagnostics messages in status mode.
There are two methods of changing "Menu mode" to "Status mode":

- Wait 30 s and the display changes mode automatically
- Press "MODE" + "SET" simultaneously and confirm the display "EXIT" with the "SET" key

Indication on the display

Table 8-6 Fault indication on the display

Line 1:	Line 2:	Meaning
Status message	- / parameters	No fault, status display
Fault message flashing	-	No fault present
	Parameters	A fault with parameters is present
	Parameters, continuous underscore	A fault with several parameters is present (e.g. AS-i addresses 0, 1, 1A, 1B, 2, 2A, 2B, ...)
Fault message flashing, continuous underscore	-	Several types of fault are present, arranged according to priority
	Parameters	Several types of fault are present; there is a parameter for the current fault type; the last parameter of a fault type is shown
	Parameters, continuous underscore	Several fault types are present; there are several parameters for the current fault type

Scanning the fault messages

There are the following methods of scanning different fault messages:

- Scrolling all parameters and fault messages with the "MODE" key
- If no key is pressed, the display will automatically jump back to the fault with the highest priority after 30 seconds
- An outgoing fault disappears immediately from the display and the next pending fault message appears

Meanings of the fault and status messages

Table 8-7 Fault and status messages of the display in status mode and remedial measures

Display	Possible cause	Possible remedial measures
RUN▫ ▫▫▫▫▫	No fault, everything OK and DP / AS-i F-Link in "Protected mode"	-
RUNc CFG▫▫	No fault, everything OK and DP / AS-i F-Link in "Config" mode	-
APF▫ ▫▫▫▫▫	AS-i voltage too low or failed (AS-i Power Fail) Can occur in parallel with "BF▫▫" or "BF▫c" messages	Check the power supply Permissible values between ASi+ and ASi- are 26.5 DC to 31.5 V DC
OFFL ▫▫▫▫▫	DP / AS-i F-Link in offline status (no data traffic on the AS-i bus) Can occur in parallel with "BF▫▫"- or "BF▫c" messages Not shown in the case of "APF▫" message	Switch the DP / AS-i F-Link online with the command "Set_Offline_Mode", for example
WAIT ▫▫▫▫▫	DP / AS-i F-Link in detection phase (power up) Can occur in parallel with "BF▫▫" or "BF▫c" messages	Wait for completion of power-up. Connect an AS-i slave to the AS-i bus if there is not already a slave connected.
CER▫ f▫▫31[1)]	AS-i configuration fault, deviation from PLANNED configuration (automatic address programming switched off or more than 1 fault) Can occur in parallel with "BF▫▫", "BF▫c", "CODE", "PFF▫" or "PFFc" messages	• Fault type "f" Remove the slave from the configuration or connect the configured slave to the AS-i bus • Fault type "E" Modify the configured slave profile in accordance with the available slave • Fault type "D" Configure the specified slave again
	Re 1) Example display; 2nd line structured as follows:	
	Character for fault type, left-justified	AS-i address, right-justified, e.g.
	f Address configured but not found	0 Standard module with address 0
	D Address found but not configured	0AB A / B module with address 0
	E Address found and configured, but configured profile (IO-ID-ID1-ID2) does not correspond to the available module	1 Standard module with address 1 1A A / B module with address 1A 31B A / B module with address 31B
AUP▫ f▫▫31[2)]	AS-i configuration fault (automatic address programming switched on) Can occur in parallel with "BF▫▫", "BF▫c", "CODE", "PFF▫" or "PFFc" messages	Connect the specified AS-i slave to the AS-i bus
	Re 2) Example display; 2nd line structured as follows:	
	Character for fault type, left-justified	AS-i address, right-justified, e.g.
	f Address configured but not found	1 Standard module with address 1
	D Address found but not configured	1A A / B module with address 1A
	E Address found and configured, but configured profile (IO-ID-ID1-ID2) does not correspond to the available module	31B A / B module with address 31B
CODE c▫▫31[3)]	Code sequence error and DP / AS-i F-Link in "Safety mode" Can occur in parallel with "BF▫▫" or "PFF▫" messages	• Check the wiring of the AS-i slave • Start teaching of the code sequences • Replace the AS-i slave

Display	Possible cause		Possible remedial measures	
	As soon as a configuration fault ("CER▫", "AUP▫") occurs, the safety section of the DP / AS-i F-Link no longer monitors the AS-i bus. Code sequence errors will therefore no longer be detected and reported.			
	Re 3) Example display; 2nd line structured as follows:			
	Character for fault type, left-justified		AS-i address, right-justified, e.g.	
	c	Address sends code sequence that does not correspond to the taught sequence	1	Standard module with address 1
			31	Standard module with address 31
	Conditions for displaying code sequence errors: • DP / AS-i F-Link in protected mode • The module is configured as an active safety module • The module sends a code sequence that the DP / AS-i F-Link does not expect. No display appears in the case of the code sequences 0000, 00xx and xx00 since they represent normal operation with opened contacts.			
PFF▫ p▫▫31[4)]	I/O fault and DP / AS-i F-Link in "Protected mode" Can occur in parallel with "BF▫▫", "CER▫", "AUP▫" or "CODE" messages		Remove the cause of the I/O fault on the AS-i slave	
	Re 4) Example display; 2nd line structured as follows:			
	Character for fault type, left-justified		AS-i address, right-justified, e.g.	
	p	Address signals I/O (periphery) fault flag (PFF)	1	Standard module with address 1
			1A	A / B module with address 1A
			31B	A / B module with address 31B
PFFc p▫▫31[4)]	I/O fault and DP / AS-i F-Link in "Config" mode Can occur in parallel with "BF▫c" messages		Remove the cause of the I/O fault on the AS-i slave	
BF▫▫ DP▫28[5)]	PROFIBUS DP fault and DP / AS-i F-Link in "Protected mode" Can occur in parallel with "CER▫", "AUP▫", "CODE", "PFF▫" or other messages		Configure the specified PROFIBUS DP node again	
	Re 5) Example display; 2nd line structured as follows:			
	"DP", left-justified		PROFIBUS DP address (0 ... 126), right-justified	
BF▫c DP▫28[5)]	PROFIBUS DP fault and DP / AS-i F-Link in "Config" mode Can occur in parallel with "PFF▫" or other messages		Configure the specified PROFIBUS DP node again	
BF▫▫ F-PAR	Invalid parameters for PROFIsafe and DP / AS-i F-Link in "Protected" mode Can occur in parallel with "CER▫" and "AUP▫" messages		Check agreement of the parameter "F_Dest_Add" on the PROFIsafe tab with the set PROFIsafe address	
BF▫c F-PAR	Invalid parameter for PROFIsafe and DP / AS-i F-Link in "Config" mode Can occur in parallel with "PFF▫" or other messages		Check agreement of the parameter "F_Dest_Add" on the PROFIsafe tab with the set PROFIsafe address	
CT▫▫ NOK▫▫	Fault detected at power-up, or power-up not successfully completed, For example, PROFIBUS DP connector not plugged in before switching on supply voltage		Connect the PROFIBUS DP connector to the PROFIBUS DP interface	
	DP / AS-i F-Link in "Configuration" mode		Change to protected mode.	
	Configuration fault pending (planned <> actual)		Eliminate the configuration fault.	
	Can occur in parallel with "BF▫▫", "CER▫" or "CFG▫▫" messages			

<table>
<tr><th>Display</th><th colspan="3">Possible cause</th><th colspan="2">Possible remedial measures</th></tr>
<tr><td rowspan="5">CTER
c▫▫31[6)]</td><td colspan="3">Invalid code sequence and DP / AS-i F-Link in "Protected mode"
Can occur in parallel with "CER▫", "AUP▫" or "PFF▫" messages</td><td colspan="2">• Check the wiring of the AS-i slave
• Replace the AS-i slave</td></tr>
<tr><td colspan="5">Re 6) Example display; 2nd line structured as follows:</td></tr>
<tr><td colspan="3">Character for fault type, left-justified</td><td colspan="2">AS-i address, right-justified, e.g.</td></tr>
<tr><td>c</td><td colspan="2" rowspan="2">Address sends code sequence that does not correspond to the guidelines on permissible code sequences</td><td>1</td><td>Standard module with address 1</td></tr>
<tr><td>31</td><td>Standard module with address 31</td></tr>
<tr><td colspan="5">Conditions for displaying "CTER":
• DP / AS-i F-Link in protected mode
• The module is configured as an active safety module
• The module sends an invalid code sequence to the DP / AS-i F-Link that violates at least one requirement with regard to the validity of code sequences</td></tr>
<tr><td>CT▫▫
c▫▫31[6)]</td><td colspan="3">Teaching of a valid code sequence for the displayed ASIsafe slave is not possible</td><td colspan="2">Close the input contacts of the displayed ASIsafe slave</td></tr>
<tr><td>MENU</td><td colspan="3">Display in "menu mode".</td><td colspan="2">Status message, change to normal mode:
• Automatic change after 30 s
• Press "MODE" + "SET" simultaneously. Confirm the display "EXIT" by pressing "SET".</td></tr>
</table>

Legend: The character "▫" represents a space

8.2.2 Listing faults via the display menu in menu mode

Fault messages are listed on the display, arranged according to AS-i addresses and fault priority, in menu mode via the submenu "LIST".

Calling the submenu "LIST"

1. Change to menu mode by pressing "SET"
2. Select the submenu "LIST" with the "MODE" key and confirm with "SET"

Indication on the display

The following messages can be shown on the display:

- "APF▫": The voltage on the AS-Interface does not correspond to the specification (AS-i Power Fail).

  After pressing "SET" or "MODE", the display changes to status mode
- Fault message and AS-i address if no "APF" pending:

  The highest priority fault messages appears in the first line. The selected AS-i address is output beside the fault symbol in the second line

You can use the following methods to process the fault messages:

- Select the AS-i address to be diagnosed with the "MODE" key (sequential order 0, 1, 1A, 1B, 2, 2A, 2B, ..., 31, 31A, 31B, EXIT, 0 ...).
- You can fix the current AS-i address with "SET". This will enable you to extend the automatic reset to 15 minutes when inactive. During fixing, two continuous underscores are visible in both display lines
- Press "SET" again to extend the fixing by a further 15 minutes
- Pressing "MODE" interrupts the fixing

Table 8-8 Fault messages of the display in menu mode

Fault message	Fault symbol	Meaning
OKAY	▫	No fault, address is active
FAIL	f	Address configured but not found
AUP▫	f	Address is configured but not available Appears during automatic address programming
DET▫	D	Address available but not configured
ERR▫	E	Address found and configured However, configured profile (IO-, ID-, ID1, ID2 code) does not correspond to the found module
CODE	C	Address sends code sequence that is not accepted by DP / AS-i F-Link
PFF▫	P	Address signals I/O (periphery) fault flag (PFF)
NO▫▫	▫	Address was removed from the LPS during fixing

Legend: The character "▫" represents a space

8.3 Diagnostics via the display frame and remedial measures

8.3.1 Introduction to diagnostics using the diagnostics frame

Notice

Diagnostics interrupts must be enabled

The DP / AS-i F-Link only reports faults on the AS-Interface via the diagnostics frame if:

- It is working in protected mode
- Diagnostics interrupts are enabled
  Interrupt enable is the default in the SIMATIC S7 Object Manager and when using the GSD file

The PROFIBUS DP master is decisive here

The methods available to you for accessing the diagnostics frame depend on the PROFIBUS DP master you use. Refer to the relevant user documentation here.

SIMATIC S7 is PROFIBUS DP master

You get the entire diagnostics frame in OB 82, e.g. by calling SFC 13 "DPNRM_DG"

Messages of the diagnostics frame

Faults on PROFIBUS DP (e.g. parameterization errors) and faults on the AS-Interface are reported to the PROFIBUS DP master via the diagnostics frame (DP slave diagnostics).

- In protected mode, the DP / AS-i F-Link sends a diagnostics frame at every configuration change to the AS-Interface.
  Configuration changes can include:
  - Voltage on AS-Interface too low (AS-i Power Fail)
  - Configuration fault (misisng or incorrect AS-i slaves, or AS-i slaves available but not configured).

  When the fault on the AS-Interface has been removed, this is reported by a "back-to-normal diagnosis" (bit 3 in station status is "0").

  The precise cause of the fault is to be found in the device-related diagnosis (within the diagnostics frame) or is available by analyzing the data records.
- In configuring mode, faults on the AS-Interface are not reported to the PROFIBUS DP master.

8.3.2 Fault and status messages of the diagnostics frame and remedial measures

Structure of the header section

The station status gives an overview of the status of a PROFIBUS DP slave.
The following applies for the individual error bits in the station status:

- 0 : no error
- 1 : Fault

Table 8-9 Station Status 1

Byte	Coding	Meaning/remedial measures	
0	Bit 0 = 1	DP / AS-i F-Link cannot be accessed by the PROFIBUS DP master	• Correct PROFIBUS address set on the DP / AS-i F-Link? • Check the bus connectors • RS485 repeater properly set?
	Bit 1 = 1	DP / AS-i F-Link not ready for data exchange	DP / AS-i F-Link already powered up?
	Bit 2 = 1	Incorrect configuration data from PROFIBUS DP master. Configuration not supported by DP / AS-i F-Link	Check the configuration
	Bit 3 = 1	Fault on AS-Interface, slave has external diagnostics data	Evaluate the device-related diagnosis
	Bit 4 = 1	Requested function not supported by DP / AS-i F-Link	Check the configuration
	Bit 5 = 1	PROFIBUS DP master cannot interpret the reply from the DP / AS-i F-Link	Check PROFIBUS DP
	Bit 6 = 1	DP / AS-i F-Link detects incorrect parameterization frame (e.g. wrong length, wrong identification number, incorrect parameters)	Check the configuration
	Bit 7 = 1	DP / AS-i F-Link has been parameterized by a different PROFIBUS DP master to the one currently accessing it	The bit is always 1 if the PG or another PROFIBUS DP master is currently used to access the DP / AS-i F-Link. The PROFIBUS address of the parameterization master is located in the diagnostics byte "Master address"

Table 8-10 Station Status 2

Byte	Coding	Meaning/remedial measures
1	Bit 0 = 1	DP / AS-i F-Link must be parameterized again
	Bit 1 = 1	Static diagnosis available
	Bit 2 = 1	Reserved
	Bit 3 = 1	Response monitoring of the DP / AS-i F-Link is active
	Bit 4 = 0	Reserved
	Bit 5 = 0	Reserved
	Bit 6 = 0	Reserved
	Bit 7 = 1	DP / AS-i F-Link is deactivated

Table 8-11 Station Status 3

Byte	Coding	Meaning
2	Bits 0...7	Reserved

Table 8-12 Master address

Byte	Coding	Meaning
3	0_H ... $7E_H$	PROFIBUS address (0 ... 126) of the PROFIBUS DP master that has parameterized the DP / AS-i F-Link
	FF_H:	Slave has not been parameterized by this PROFIBUS DP master

Table 8-13 PNO ident number

Byte	Coding	Meaning
4	81_H	Manufacturer ID (PI identification number)
5	$4E_H$	

Structure of the extended diagnosis

Table 8-14 Identifier-related diagnostics

Byte	Coding	Meaning
6	43_H	Read-only
7	Bit structure of the slot number	
	Bit 0 = 1	Group error bit
	Bit 1 = 0	Read-only
	Bit 2 = 0	Read-only
	Bit 3 = 0	Read-only
	Bit 4 = 1	Diagnostics slot F-Link (PROFIsafe)
	Bit 5 = 1	Diagnostics slot DP/AS-i (16/16 bytes or 32/32 bytes)
	Bit 6 = 0	Read-only
	Bit 7 = 0	Read-only
8	00_H	Read-only

Table 8-15 Device-Related Diagnostics

Byte	Coding	Value/meaning
9	14_H	Length of the device-related diagnostics including length specification
10	01_H	Diagnostics interrupt
11	03_H	Interrupt from slot F-Link (PROFIsafe)
	04_H	Interrupt from slot DP/AS-i

Byte	Coding	Value/meaning
12	Specifier	
	Bit 0 to 1	Interrupt specifier 00 = No further information 01 = Incoming fault on slot 10 = Outgoing fault slot, no fault 11 = Outgoing fault slot, not yet fault-free
13	Module status 1	
	Bit 0 = 1	Group errors
	Bit 1 = 1	Internal fault (device fault, e.g. EEPROM defective)
	Bit 2 = 1	External fault (e.g. AS-i slave failed or APF)
	Bit 3 = 1	At least one AS-i slave deviates from the default
	Bit 4 = 1	Voltage on AS-Interface too low (APF)
	Bit 5...7 = 0	Reserved
14	$1C_H$:	Read-only
15	Module status 2	
	Bit 0 = 1	At least one AS-i slave deviates from the default
	Bit 1 = 0	Reserved
	Bit 2 = 0 Bit 2 = 1	Normal status DP / AS-i F-Link is offline
	Bit 3 = 1	Hardware fault (internal watchdog)
	Bit 4...7 = 0	Reserved
16	Module status 3	
	Bit 0...1 = 0	Reserved
	Bit 2 = 1	defective EEPROM
	Bit 3...7 = 0	Reserved
17	$7F_H$	Read-only
18	40_H	Read-only
19	01_H	Read-only
20	01_H	Read-only
21	Fault on AS-i Slave 0 / 0A ... 7 / 7A The fault bit in byte 21... 28 is set if: • Configured AS-i slave is not found or activated on the AS-Interface • Unconfigured AS-i slave found on AS-Interface	
	Bit 0 = 1	Fault on AS-i Slave 0
	Bit 1 = 1	Fault on AS-i slave 1 / 1A
	...	...
	Bit 7 = 1	Fault on AS-i slave 7 / 7A
22	Bit 0 to 7	Fault on AS-i Slave 8 / 8A ... 15 / 15A
23	Bit 0 to 7	Fault on AS-i Slave 16 / 16A ... 23 / 23A
24	Bit 0 to 7	Fault on AS-i Slave 24 / 24A ... 31 / 31A
25	Bit 0 to 7	Fault on AS-i slave 0B ... 7B
26	Bit 0 to 7	Fault on AS-i slave 8B ... 15B
27	Bit 0 to 7	Fault on AS-i slave 16B ... 23B
28	Bit 0 to 7	Fault on AS-i slave 24B ... 31B

8.4 Using data records for diagnostics information

With selective evaluation of data records, you can read out further diagnostics and status information on the relevant AS-i slaves via a user program.
Data records that are suitable for fault diagnostics include especially data record 92 (diagnostics data record) and data record 150 (binary image of the I/O data of the AS-i master). For this purpose, use the commands Read_Data_Record and Write_Data_Record in the user program. You can find more detailed information on the call and the structure of data records in the appendix.

See also

Calling the acyclic PROFIBUS DP services/data records (Page A-5)

8.5 Replacing hardware

8.5.1 Replacing an AS-i slave/automatic address programming

This operating instruction describes how to use the function "Automatic address programming" (also called "Automatic AS-i address assignment") to quickly replace an AS-i slave.

Requirements for the function "Automatic address assignment"

Please note that the function "Automatic address programming" is only of use when:

- The DP / AS-i F-Link is running in protected mode
- The function is configured
  - OM configuration: "Automatic AS-i Address Assignment" activated on the "Operating Parameters", "Properties - DP/AS-i - ..." dialog
  - GSD configuration: Selection "on" for "Automatic AS-i Addressing" on the "Parameterization" tab, "Device-Specific Parameters" folder
- The diagnostics display shows the fault message "AUP▫"
- Precisely one AS-i slave is being replaced
- The IO and ID codes of the replaced AS-i slaves are identical

Procedure

1. Disconnect the previous AS-i slave from the AS-Interface cable
2. Replace the previous AS-i slave with an identical AS-i slave (same IO, ID, ID1, ID2 code) with the address "0" (factory status)

Results

- The DP / AS-i F-Link now assigns the address of the original node to this AS-i slave
- The fault message "AUP▫" in the diagnostics display disappears

Notice

Teaching new code sequences when replacing an ASIsafe slave

When replacing an ASIsafe slave, the display "CODE" appears on the DP / AS-i F-Link. Carry out teaching of all code sequences.

Warning

Checking the new ASIsafe slave

After replacing an ASIsafe slave you must check the correct functioning of the new slave.

See also

"Operating Parameters" tab in the "Properties - DP/AS-i -..." dialog box (Page 5-17)

8.5.2 Replacing several AS-i slaves

This operating instruction describes how to replace several AS-i slaves.

Requirements

Replacement of several AS-i slaves requires the following:

- Different AS-i addresses must occur only once per AS-i segment
- AS-i address "0" must only occur when the function "Automatic address programming" is not active

Procedure

1. Disconnect the AS-i slaves to be replaced from the AS-Interface cable
2. Replace the AS-i slaves with identical AS-i slaves (same IO, ID, ID1, ID2 code)
3. Assign the previous addresses to the new AS-i slaves

Note

Addressing the AS-i slaves

The following methods of addressing the AS-i slaves are available to you:

- Using the display menu of the DP / AS-i F-Link
  Please note the sectioni "Modifying the AS-i address of a module" in the chapter "Configuring"
- Via an external addressing device, e.g. order no. 3RK1 904-2AB01

Notice

teaching new code sequences when replacing ASIsafe slaves

When replacing ASIsafe slaves, the display "CODE" appears on the DP / AS-i F-Link.

Carry out teaching of all code sequences again.

Warning

Checking the new ASIsafe slaves

After replacing ASIsafe slaves you must check the correct functioning of the new slaves.

8.5.3 Removing ASIsafe slaves

ASIsafe slaves can be removed during operation or when the DP / AS-i F-Link is switched off.

Removal of an ASIsafe slave during operation or after restart of the DP / AS-i F-Link results in display of the fault message "CER▫" and in failure of PROFIsafe communications. Confirm the fault message as follows, depending on the configuration:

- Configuration in the OM:
  Change the configuration in the OM according to the pending configuration.
- Configuration with GSD file:
  Change the DP / AS-i F-Link to Config mode and save the detected configuration (press-of-a-button configuring)

PROFIsafe communication starts after the cause of the fault has been removed. The code sequences of the ASIsafe slaves are stored in the EEPROM of the DP / AS-i F-Link. Code sequences that are no longer required are deleted during power-up. This means the code sequences no longer need to be taught.

8.5.4 Replacing the DP / AS-i F-Link

Note

Description of the menu commands in the device display

To carry out the individual menu commands, please note the section "Settings and operator inputs on the device" in the chapter "Configuring"

Procedure

Carry out the following steps to replace a DP / AS-i F-Link:

1. Switch the 24 V DC power supply off.
2. Disconnect PROFIBUS DP.
   Loosen the screws of the PROFIBUS DP connector and remove the connector.
3. Remove the terminal blocks.
   Please note the paragraph below "Removing terminal blocks from the device".
4. Uninstall the DP / AS-i F-Link.
   Please note the instructions "Uninstalling from DIN rails" or "Uninstalling from a level surface" in the section "Uninstalling the device" in the chapter "Installing/connecting".
5. Mount the new DP / AS-i F-Link.
   Please note the sections "Mounting the device on DIN rail" or "Mounting the device on a level surface" in the chapter "Mounting/connecting".
6. Connect the terminal blocks again.
   Please note the paragraph below "Connecting terminal blocks on the device".
7. Secure the PROFIBUS DP connector again.
   Plug in the PROFIBUS DP connector and tighten the screws.
8. Switch the 24 V DC power supply on again.
9. Set the PROFIsafe address on the device (F-DP).
   The menu "F-DP" appears in the case of a new device (or a device with factory settings) as the first display. Otherwise select this menu item.
10. Set the PROFIBUS address on the device (DP).
    The menu "DP▫▫" appears on a new device after the PROFIsafe address has been entered. Otherwise select this menu item.
11. If you **do not** use a new DP / AS-i F-Link, switch the 24 V DC power supply off and on again to accept the PROFIBUS address.
12. Proceed as follows depending on the method of configuration:
    - When configuring via OM, the menu "CT▫▫" appears after the device has received its startup data records from the CPU.
    - When configuring with the GSD file, save the pending configuration in the menu "MODE" with the confirmation of "PSET▫" (pushbutton configuring). The menu "CT▫▫" then appears.

13. Close all input contacts of the ASIsafe slaves for teaching of the code sequences.
14. Start teaching of the code tables with the "SET" key.

Results

Replacement is complete. Safety mode is possible again with the DP / AS-i F-Link.

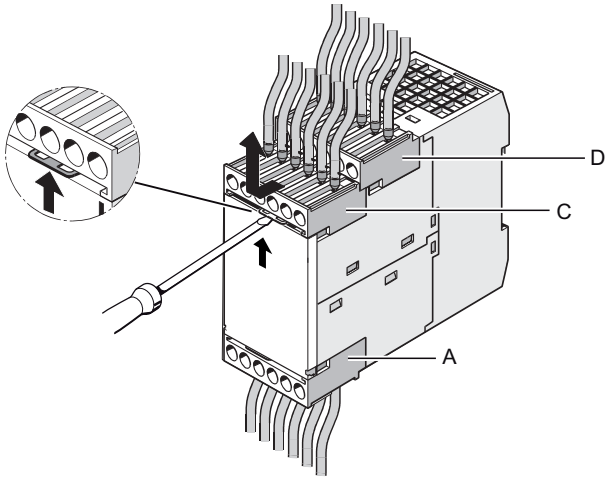
Removing terminal blocks from the device

Notice

Order of removal

Remove terminal block C before terminal block D.

Table 8-16 Procedure when removing the terminal blocks

Step	Operating instruction	Picture
1	Insert a flat-head screwdriver between the clip of the removable terminal block and the front panel (see figure)	
2	Pull the removable terminal block out to the front	
3	Lift the removable terminal block out of the mechanically coded guiderail of the device	

Plug the terminal blocks into the device

Notice

Removal terminal blocks are mechanically coded to prevent polarity reversal

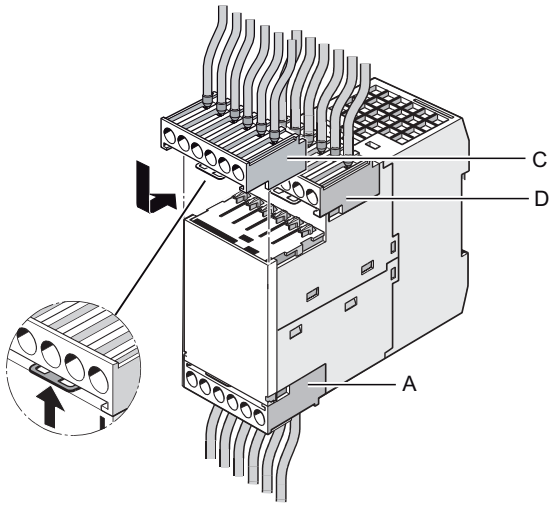
The removable terminal blocks are mechanically coded to prevent polarity reversal and are labeled with A, C or D on the inside. Use only the slots provided and shown in the picture.

Notice

Plug-in sequence

Plug in terminal block D first, followed by terminal block C

Table 8-17 Procedure when plugging in the terminal blocks

Step	Operating instruction	Picture
1	Insert the removable terminal block into the mechanically coded guiderail of the device	
2	Slide the removable terminal block back until it audibly engages	
3	Check that the clip of the removable termínal block closes flush with the front panel (please note the picture extract)	

See also

Disconnecting and uninstalling the device (Page 3-7)

Connecting the device via terminal blocks (Page 3-4)

Mounting the device on a DIN rail (Page 3-2)

Mounting the device on a level surface (Page 3-3)

Technical data

9

This chapter provides you with the following information on the DP / AS-i F-Link:

- Area of application
- Permitted ambient conditions
  - Operating temperature and transport/storage temperature
  - Operating altitude
  - Operating pressure
  - Relative humidity
- Mechanical data
  - Dimensions
  - Mounting location
  - Degree of protection
  - Shock resistance
  - Testing regulations
  - Weight
- Interfaces/connections
  - PROFIBUS DP
  - AS-Interface
  - Power supply
- Connection data for terminal blocks
  - Cable cross-sections
  - Connection tools
- Test voltages
- Safety-related data
  - Safety characteristics
  - Reaction times

9.1 Permitted ambient conditions

Table 9-1 Permitted ambient conditions

Date	Value
Operating temperature	0 °C ... + 50 °C
Operating altitude	Up to 2,000 m above sea level
Pressure	< 90 kPa
Relative humidity	10 % … 95 %
Transport/storage temperature	- 40 °C ... + 85 °C

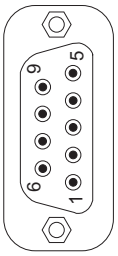
9.2 Mechanical data

Table 9-2 Mechanical data

Date	Specification	Value
Dimensions	Device: - Width - Height - Depth	 45 mm 111 mm (with screw-type terminals) 113 mm (with spring-loaded terminals) 124 mm
	Mounting on DIN rail/ mounting on level surface	35 mm in accordance with DIN EN 60715 -
	Mounting position	Vertically (with regard to mounting on horizontal DIN rail on vertical wall)
	Minimum distances (for convection cooling): from the ventilation slits from the sides of the device	 25 mm -
Degree of protection	In accordance with IEC 60529	IP 20
Shock resistance	Sine pulse	15 g / 11 ms
Testing regulations	Immunity to electromagnetic interference acc. to IEC 60947-1	Meets Corresponds to severity level 3
	Electromagnetic interference emission acc. to IEC 60947-1	Meets Corresponds to severity level A
Practice-oriented testing methods	Protective panel	Successfully concluded
Weight	-	300 g

9.3 Interfaces/connections/display elements

Table 9-3 Interfaces/connections/display elements

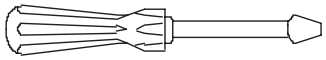
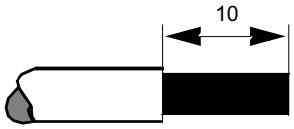
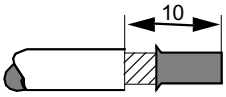
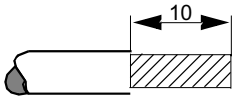
Date	Specification	Value		
PROFIBUS DP	Physical interface characteristics	RS 485		
	Connectors	One PROFIBUS DP interface as a 9-pin sub-D socket, pin assignments according to DIN EN 61158-2		
	Front view of socket	PIN	Identifier	Function
		1	n. c.	Reserved
		2	n. c.	Reserved
		3	BUS B	Data line B
		4	RTS	Transmission request
		5	P-	Chassis ground
		6	P+	Supply voltage
		7	n. c.	Reserved
		8	BUS A	Data line A
		9	n. c.	Reserved
		-	SHIELD	Shield over connector housing
	Load rating 5 V DC on PROFIBUS DP	Maximum 100 mA		
	Transfer rates (automatic detection)	Support for the transfer rates defined by the PROFIBUS DP standard: 9.6 kbit/s 19.2 kbit/s 45.45 kbit/s 93.75 kbit/s 187.5 kbit/s 500 kbit/s 1500 kbit/s 3000 kbit/s 6000 kbit/s 12000 kbit/s		
AS-Interface	Connectors	ASi+ and ASi- terminals of the removable terminal blocks		
	AS-i power supply via external AS-i power supply:			
	Rated control supply voltage U_S (acc. to DIN EN 61131-2)	DC 30 V		
	Working range	0.8 ... 1.2 U_S		

Date	Specification	Value
	AS-i cycle time The values apply for the possible full configuration on the DP / AS-i F-Link in each case	• 5 ms with standard slaves • 10 ms in the case of slaves with extended address range • 10 ms in the case of inputs acc. to profile S-7.A.7 • 20 ms in the case of outputs acc. to profile S-7.A.7 • 40 ms in the case of inputs/outputs acc. to profile S-7.A.A • 20 ms with Fast Analog acc. to profile S-7.A.8 and S-7.A.9 • 5 ms with Super Fast Analog acc. to profile S-6.0.X
Power Supply	Connectors	L+, M and FE terminals of the removable terminal blocks
	Device power supply via power section in accordance with IEC 60 536 protection class III (SELV or PELV)	
	Total power consumption I_{Total}	≤ 110 mA
	Power consumption P	3 W
	Rated operating supply voltage (PELV) U_S (acc. to DIN EN 61131-2) Working range	DC 24 V 0,85 ... 1,15 U_S
Display elements	Display	LCD, 14.5 mm x 12.5 mm Two lines: In the upper line 4 positions and in the lower line 5 positions as dot matrix, backlighting: red
	LEDs	4 LEDs for status and diagnostics
Control elements	Keys	3 keys for selection, confirmation and factory setting

9.4 Connection data for terminal blocks

The following connection data apply dependent on the removable terminal block:

Table 9-4 Connection data in the case of terminal connection

Date	Specification and value in the case of removable terminal blocks with screw-type terminals	Specification and value in the case of removable terminal blocks with spring-loaded terminals
Screwdriver 	Cross-tip screwdriver Size: PZ 2 (⌀ 5 … 6 mm) Torque: 0.8 … 1.2 Nm	Screwdriver Size: 0 or 1 (width to 3 mm) for raising the terminal springs
Rigid cable 	Maximum number of cables x cable cross-section: 1 x 0.5 … 4.0 mm² or 2 x 0.5 … 2.5 mm²	Maximum number of cables x cable cross-section: 2 x 0.25 … 1.5 mm²
Flexible cable with end sleeve/cable lug 	Maximum number of cables x cable cross-section: 1 x 0.5 … 2.5 mm² or 2 x 0.5 … 1.5 mm²	Maximum number of cables x cable cross-section: 2 x 0.25 … 1.5 mm²
Flexible cable 	Not allowed	Maximum number of cables x cable cross-section: 2 x 0.25 … 1.5 mm²

9.5 Test voltages

Table 9-5 Test voltages

Specification	Value
Rated impulse withstand voltage V_{imp}	500 V
Rated insulation voltage V_i	50 V

9.6 Safety characteristics

Table 9-6 Maximum achievable safety classes

Standards	Identifier	Value
IEC 61508	SIL	3
EN 954-1	Category	4

Table 9-7 Safety characteristics

Description	Identifier	Value
Probability of a failure in the case of a mode with high or continuous demand (high demand / continuous mode)	PFH	$1{,}5 \cdot 10^{-9} \cdot 1$ / hour
Proof-Test Interval	T1	20 years

9.7 Reaction times

Table 9-8 Reaction times

Date	Specification	Value
Maximum response time	with no faults	59 ms
	when a fault occurs	66 ms

Warning

Increased response time

A configured input delay greater than 0 ms has a cumulative effect on the maximum response time.

Please note here the section ""ASIsafe" tab in the "Properties - AS-i F Slave -..." dialog box" in the chapter "Configuring".

Appendix

A

A.1 Dimensional Drawings

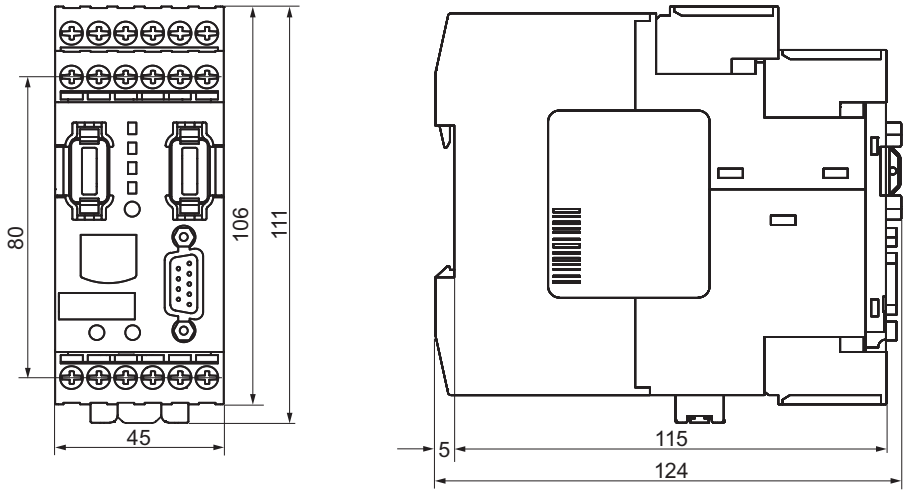


Figure A-1 Dimension drawing DP / AS-i F-Link with screw-type terminals (MLFB: 3RK3141-1CD10)

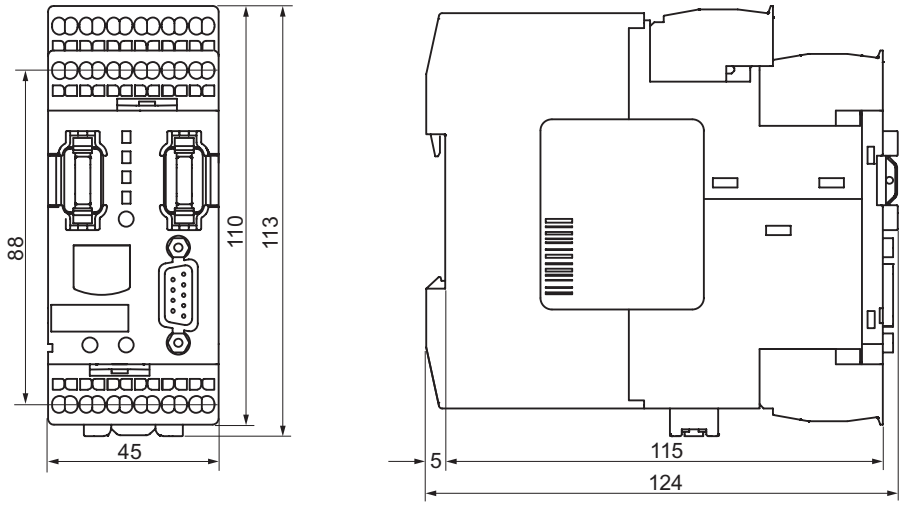


Figure A-2 Dimension drawing DP / AS-i F-Link with spring-loaded terminals (MLFB: 3RK3141-2CD10)

A.2 Hole drilling template

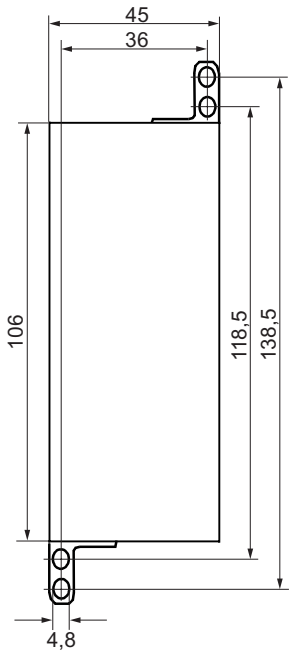


Figure A-3 Hole drilling template DP / AS-i F-Link with securing lugs for screw fixings (3RP1903)

A.3 Spare Parts/Accessories

The following spare parts/accessories are available:

Table A-1 Spare Parts/Accessories

Spare Parts/Accessories	Order No./MLFB
DP / AS-i F-Link with screw-type terminals	3RK3141-1CD10
DP / AS-i F-Link with spring-loaded terminals	3RK3141-2CD10
Two fixing lugs for securing screws	3RP1903
Manual "DP / AS-i F-Link"	Downloadable free on the Internet at http://support.automation.siemens.com/WW/view/en/24063754 on the "Manuals" tab
Connector for PROFIBUS DP, 12 Mbit/s, 90° cable outlet, terminating resistor with isolating function without PG connection	6ES7972-0BA12-0XA0
Connector for PROFIBUS DP, 12 Mbit/s, 90° cable outlet, terminating resistor with disconnection function with PG connection	6ES7972-0BB12-0XA0

A.4 AS-Interface Protocol Implementation Conformance Statement (PICS)

Table A-2 PICS for DP / AS-i F-Link

Manufacturer	SIEMENS AG
Product name	DP / AS-i F-Link
Order No.	3RK3141-1CD10 with screw-type terminals 3RK3141-2CD10 with spring-loaded terminals
Version	1
Master profile	M4
Date	01.10.2006 (AS-i certification)

Table A-3 List of available functions

No.	Function	M4	Access to the function
Section A Function or call to the host interface (symbolic representation)			
1	Image, status = Read_IDI()	X	z / K / DR
2	Status = Write_ODI(Image)	X	z
3	Status = Set_Permanent_Parameter(S_Addr, S_Param)	X	K / DR
4	S_Param, Status = Get_Permanent_Parameter(S_Addr)	X	K / DR
5	Status, RS_Param = Write_Parameter(S_Addr, S_Param)	X	K
6	Status, S_Param = Read_Parameter(S_Addr)	X	K / DR
7	Status = Store_Actual_Parameters()	X	K
8	Status = Set_Permanent_Configuration(S_Addr, S_Config)	X	K / DR
9	Status, S_Config = Get_Permanent_Configuration(S_Addr)	X	K / DR
10	Status = Store_Actual_Configuration()	X	K
11	Status, S_Config = Read_Actual_Configuration(S_Addr)	X	K / DR
12	Status = Set_LPS(S_List)	X	K / DR
13	Status, S_List = Get_LPS()	X	K / DR
14	Status, S_List = Get_LAS()	X	K / DR
15	Status, S_List = Get_LDS()	X	K / DR
16.0	Status, Flags = Get_Flags()	X	K / DR
16.1	Status, Flag = Get_Flag_Config_OK()	X	K / DR
16.2	Status, Flag = Get_Flag_LDS.0()	X	K / DR
16.3	Status, Flag = Get_Flag_Auto_Address_Assign()	X	K / DR
16.4	Status, Flag = Get_Flag_Auto_Prog_Available()	X	K / DR
16.5	Status, Flag = Get_Flag_Configuration_Active()	X	K / DR
16.6	Status, Flag = Get_Flag_Normal_Operation_Active()	X	K / DR
16.7	Status, Flag = Get_Flag_APF()	X	K / DR
16.8	Status, Flag = Get_Flag_Offline_Ready()	X	K / DR
16.9	Status, Flag = Get_Flag_Periphery_OK()	X	K / DR
17	Status = Set_Operation_Mode(Mode)	X	K
18	Status = Set_Offline_Mode(Mode)	X	K
19	Status = Activate_Data_Exchange(Mode)	X	K
20	Status = Change_Slave_Address(S_Addr1, S_Addr2)	X	K

No.	Function	M4	Access to the function
21.1	Status = Set_Auto_Address_Enable(Mode)	X	K
21.2	Mode = Get_Auto_Address_Enable()	X	K
22.1	Status, Resp = Cmd_Reset_AS-i_Slave(S_Addr, RESET)	0	-
22.2	Status, Resp = Cmd_Read_IO_Configuration(S_Addr, CONF)	0	-
22.3	Status, Resp = Cmd_Read_Identification_Code(S_Addr, IDCOD)	0	-
22.4	Status, Resp = Cmd_Read_Status(S_Addr, STAT)	0	-
22.5	Status, Resp = Cmd_Read_Reset_Status(S_Addr, STATRES)	0	-
22.6	Status, Resp = Cmd_Read_Ext_ID-Code_1(S_Addr, IDCOD1)	0	-
22.7	Status, Resp = Cmd_Read_Ext_ID-Code_2(S_Addr, IDCOD2)	0	-
23	Status, S_List = Get_LPF()	X	K
24	Status = Write_Extended_ID–Code_1(S_Ext_ID-Code_1)	X	K
25	AImage, Status = Read_AIDI()	X	z / K / DR
26	Status = Write_AODI(AImage)	X	z / K / DR
27	String, Status = Read_ParamStr(S_Addr)	X	K
28	Status = Write_ParamStr(S_Addr, String)	X	K
29	String, Status = Read_DiagStr(S_Addr)	X	K
30	String, Status = Read_IdentStr(S_Addr)	X	K
Section B Function on the slave interface			
1	Support of the expanded address area	X	-
2	Support of CTT1 (profile 7.3 only)	X	-
3	Complete support of CTT1	X	-
4	Support of CTT2	X	-
5	Support of CTT3	X	-
6	Support of CTT4	X	-
7	Support of CTT5	X	-

Table A-4 Meaning of the symbols

Characters	Meaning
X	Function available
0	Function not available
z	Via cyclic PROFIBUS services
K	Via AS-i command (Chapter "Command interface")
DR	Via data record ("Data records" appendix)

A.5 Data records

A.5.1 Calling the acyclic PROFIBUS DP services/data records

The acyclic services in accordance with PROFIBUS standard DP-V1 allow you to carry out special jobs (data records) for sending output data to PROFIBUS DP slaves or for receiving input data from PROFIBUS DP slaves as an alternative to cyclic data transfer.

Calls

Table A-5 Calling the acyclic DP services/data records

Call	SIMATIC S7	PC/PG: SIMATIC NET programming interface
Read_data_record	SFC 59	dpc*_read
Write_data_record	SFC 58	dpc*_write

Call parameters for sending/receiving

Certain parameters must be assigned to specify the job. The names of these parameters and the method of parameterization can vary according to the type of the PROFIBUS DP master.
The table below provides an overview of the parameters in accordance with the DP-V1 specification and gives an example of their mapping to the parameterization in a user program.

Table A-6 Call parameters for sending/receiving

DP-V1 specification	SIMATIC S7 (SFC 58 / 59)	For PC/PG: SIMATIC NET programming interface (dpc*_write / read)	Meaning
PROFIBUS address	LADDR The start address of the cyclic input byte of the DP / AS-i F-Link must be specified. The S7-CPU calculates the PROFIBUS address from this specification	C_Ref	PROFIBUS address of the DP / AS-i F-Link (PROFIBUS DP slave)
	IOID The following fixed value must be entered here: B#16#54	-	Fixed value
Slot_number	Calculated from LADDR, not an SFC parameter	Slot_number	In the case of DP / AS-i F-Link: Slot no. 0, 2, 4, 5
Index	RECNUM	Index	The DP / AS-i F-Link supports the data record numbers given in the appendix
Length	RECORD referenced via ANY pointer	Length_s	Length of an I/O data area
Data	RECORD referenced via ANY pointer	Data_s	Address of the I/O data area
-	RET_VAL BUSY	-	Return parameter for execution check

Note

Acyclic services

Please note the chapter "Command interface" for exchanging further data via acyclic services

Notice

Jobs are limited

With SIMATIC S7, only a limited number of "Read_data_record" and "Write_data_record" jobs can be active simultaneously. The maximum permissible number depends on the S7-CPU.
If more jobs are initiated, they will be terminated with error $80C3_H$ (temporary resource bottleneck). The rejected job must then be repeated.

A.5.2 Overview of data records

You can use the following data records with the calls Read_Data_Record and Write_Data_Record:

Table A-7 Overview of data records

Data record	Intended use	Access
DR 2	Command interface	r/w
DR 92	Diagnosis	r
DR 140	AS-i analog slave 1 ... 30	r/w
DR 141	AS-i analog slave 5 ... 31	r/w
DR 142	AS-i analog slave 9 ... 31	r/w
DR 143	AS-i analog slave 13 ... 31	r/w
DR 144	AS-i analog slave 17 ... 31	r/w
DR 145	AS-i analog slave 21 ... 31	r/w
DR 146	AS-i analog slave 25 ... 31	r/w
DR 147	AS-i analog slave 29 ... 31	r/w
DR 150	Binary image of the I/O data of the AS-i master	r
DR 151	Analog image of the outputs slaves 1 ...29	r
DR 152	Analog image of the inputs slaves 1 ... 29	r
DR 153	Analog image of the outputs slaves 3 ... 31	r
DR 154	Analog image of the inputs slaves 3 ... 31	r
DR 202	Parameter/parameter echo	r
DR 203	Read extended overall configuration	r
DR 205	Read flags	r

A.5.3 Data record 2 - command interface

Job processing of the command interface runs via data record 2. Commands can be sent and reply data received with it. The length is variable and depends on the command in each case.

The command number is always irrelevant for **sending** DR 2. The number of bytes of job data varies with each command.

Table A-8 Structure of data record 2, send

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Command number							
(1)	(Job data)							
...	...							

For **receiving** DR 2, the number of bytes of reply data varies with each command.

Table A-9 Structure of data record 2, receive

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
(0)	(Reply data)							
...	...							

Note

Use of DR 2 for the command interface

For the use of DR 2 for AS-i commands, please note the explanations in the chapter "Command interface".

A.5.4 Data record 92 - Diagnostics

Data record 92 is the diagnostics data record. In the case of diagnostics interrupts, it supplies more detailed information for fault correction.

Table A-10 Structure of data record 92

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							
4	Reserved	Reserved	0 = teaching of code sequences not required 1 = teaching required	00 = No code sequences taught 01 = Code sequences taught 10 = Code sequences taught and others available for teaching 11 = All code sequences taught		0 = Master not protected mode 1 = Master protected mode	0 = Master offline 1 = Master online	0 = teaching not active 1 = teaching active
5	Reserved							
6	Reserved							
7	Reserved							
8	Slave 1 / 1A diagnostics byte 1							
9	Slave 1 / 1A diagnostics byte 2							
10	Slave 2 / 2A diagnostics byte 1							
11	Slave 2 / 2A diagnostics byte 2							
...	...							
68	Slave 31 / 31A diagnostics byte 1							
69	Slave 31 / 31A diagnostics byte 2							
70	Reserved							
71	Reserved							
72	Slave 1B diagnostics byte 1							
73	Slave 1B diagnostics byte 2							
...	...							
132	Slave 31B diagnostics byte 1							
133	Slave 31B diagnostics byte 2							
134	Flag 1							
135	Flag 2							

Table A-11 Coding of diagnostics byte 1 and diagnostics byte 2

Bit	Diagnostic byte 1	Diagnostic byte 2
0	1 = I/O fault	1 = F-DI 1 closed
1	1 = Slave active	1 = F-DI 2 closed
2	1 = Slave is F slave	1 = Discrepancy violation
3	1 = Code sequence error during operation	1 = Power up condition not met
4	1 = Error in code sequence during teaching	1 = Planned <> Actual
5	1 = Code sequence not unique	Reserved
6	1 = No code sequence taught	Reserved
7	Reserved	Reserved

Table A-12 Description of the flag contents of flag 1

Bit	Meaning	Description
0	OFFLINE_READY	The flag is set if the offline phase is active.
1	APF	The flag is set if the voltage on the AS-i cable is too low.
2	NORMAL_MODE	The flag is set when the DP / AS-i F-Link is in normal mode.
3	OPERATING MODE	The flag is set in configuring mode and reset in protected mode.
4	AUTO_ADDR_AVAIL	The flag is set if automatic address programming can be carried out (i.e. precisely **one** AS-i slave has currently failed).
5	AUTO_ADDR_ASSIGN	The flag is set if automatic address programming is possible (that is, AUTO_ADDR_ENABLE = 1 **and** no "incorrect" AS-i slave is connected to the AS-Interface).
6	LDS_0	The flag is set if an AS-i slave with operating address "0" is available.
7	CONFIG_OK	The flag is set when the planned configuration and the actual configuration agree.

Table A-13 Description of the flag contents of flag 2

Bit	Meaning	Description
0	OFFLINE	The flag is set if the operating status "OFFLINE" is to be adopted or has already been adopted.
1	INTERNAL	The flag is always set.
2	EEPROM_OK	The flag is set if the test of the internal EEPROM was successful.
3	AUTO_ADDR_ENABLE	The flag indicates whether automatic address programming by the user is disabled (BIT = 0) or enabled (BIT = 1).
4	PERIPHERY_FAULT	The flag is set if at least one AS-i slave signals an I/O fault.
5	Reserved	-
6	Reserved	-
7	MPO startup	The flag "Master_Power_on-startup" is set after the supply voltage of the AS-i slave master has been switched on. The bit is reset when the master changes later to OFFLINE.

A.5.5 Data record 140 - Analog slave 1 - 30

Data record 140 enables acyclic reading and writing of analog data for slave addresses 1 to 30. The length of the data record is 240 bytes.
The addresses for the input and output data area are assigned via the call parameter "Data" in accordance with DP-V1. Please note the table "Call parameters for sending/receiving" in the section "Analog data via acyclic PROFIBUS DP services".

Table A-14 Structure of data record 140

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Slave 1 Channel 1 High Byte							
1	Slave 1 Channel 1 Low Byte							
2	Slave 1 Channel 2 High Byte							
3	Slave 1 Channel 2 Low Byte							
4	Slave 1 Channel 3 High Byte							
5	Slave 1 Channel 3 Low Byte							
6	Slave 1 Channel 4 High Byte							
7	Slave 1 Channel 4 Low Byte							
8	Slave 2 Channel 1 High Byte							
9	Slave 2 Channel 1 Low Byte							
10	Slave 2 Channel 2 High Byte							
11	Slave 2 Channel 2 Low Byte							
12	Slave 2 Channel 3 High Byte							
13	Slave 2 Channel 3 Low Byte							
14	Slave 2 Channel 4 High Byte							
15	Slave 2 Channel 4 Low Byte							
…	…							
232	Slave 30 Channel 1 High Byte							
233	Slave 30 Channel 1 Low Byte							
234	Slave 30 Channel 2 High Byte							
235	Slave 30 Channel 2 Low Byte							
236	Slave 30 Channel 3 High Byte							
237	Slave 30 Channel 3 Low Byte							
238	Slave 30 Channel 4 High Byte							
239	Slave 30 Channel 4 Low Byte							

A.5.6 Data record 141 - Analog slave 5 - 31

Data record 141 enables acyclic reading and writing of analog data for slave addresses 5 to 31. The length of the data record is 216 bytes.
The addresses for the input and output data area are assigned via the call parameter "Data" in accordance with DP-V1. Please note the table "Call parameters for sending/receiving" in the section "Analog data via acyclic PROFIBUS DP services".

Table A-15 Structure of data record 141

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Slave 5 Channel 1 High Byte							
1	Slave 5 Channel 1 Low Byte							
2	Slave 5 Channel 2 High Byte							
3	Slave 5 Channel 2 Low Byte							
4	Slave 5 Channel 3 High Byte							
5	Slave 5 Channel 3 Low Byte							
6	Slave 5 Channel 4 High Byte							
7	Slave 5 Channel 4 Low Byte							
8	Slave 6 Channel 1 High Byte							
9	Slave 6 Channel 1 Low Byte							
10	Slave 6 Channel 2 High Byte							
11	Slave 6 Channel 2 Low Byte							
12	Slave 6 Channel 3 High Byte							
13	Slave 6 Channel 3 Low Byte							
14	Slave 6 Channel 4 High Byte							
15	Slave 6 Channel 4 Low Byte							
…	…							
208	Slave 31 Channel 1 High Byte							
209	Slave 31 Channel 1 Low Byte							
210	Slave 31 Channel 2 High Byte							
211	Slave 31 Channel 2 Low Byte							
212	Slave 31 Channel 3 High Byte							
213	Slave 31 Channel 3 Low Byte							
214	Slave 31 Channel 4 High Byte							
215	Slave 31 Channel 4 Low Byte							

A.5.7 Data record 142 - Analog slave 9 - 31

Data record 142 enables acyclic reading and writing of analog data for slave addresses 9 to 31. The length of the data record is 184 bytes.
The addresses for the input and output data area are assigned via the call parameter "Data" in accordance with DP-V1. Please note the table "Call parameters for sending/receiving" in the section "Analog data via acyclic PROFIBUS DP services".

Table A-16 Structure of data record 142

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Slave 9 Channel 1 High Byte							
1	Slave 9 Channel 1 Low Byte							
2	Slave 9 Channel 2 High Byte							
3	Slave 9 Channel 2 Low Byte							
4	Slave 9 Channel 3 High Byte							
5	Slave 9 Channel 3 Low Byte							
6	Slave 9 Channel 4 High Byte							
7	Slave 9 Channel 4 Low Byte							
8	Slave 10 Channel 1 High Byte							
9	Slave 10 Channel 1 Low Byte							
10	Slave 10 Channel 2 High Byte							
11	Slave 10 Channel 2 Low Byte							
12	Slave 10 Channel 3 High Byte							
13	Slave 10 Channel 3 Low Byte							
14	Slave 10 Channel 4 High Byte							
15	Slave 10 Channel 4 Low Byte							
…	…							
176	Slave 31 Channel 1 High Byte							
177	Slave 31 Channel 1 Low Byte							
178	Slave 31 Channel 2 High Byte							
179	Slave 31 Channel 2 Low Byte							
180	Slave 31 Channel 3 High Byte							
181	Slave 31 Channel 3 Low Byte							
182	Slave 31 Channel 4 High Byte							
183	Slave 31 Channel 4 Low Byte							

A.5.8 Data record 143 - Analog slave 13 - 31

Data record 143 enables acyclic reading and writing of analog data for slave addresses 13 to 31. The length of the data record is 152 bytes.
The addresses for the input and output data area are assigned via the call parameter "Data" in accordance with DP-V1. Please note the table "Call parameters for sending/receiving" in the section "Analog data via acyclic PROFIBUS DP services".

Table A-17 Structure of data record 143

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Slave 13 Channel 1 High Byte							
1	Slave 13 Channel 1 Low Byte							
2	Slave 13 Channel 2 High Byte							
3	Slave 13 Channel 2 Low Byte							
4	Slave 13 Channel 3 High Byte							
5	Slave 13 Channel 3 Low Byte							
6	Slave 13 Channel 4 High Byte							
7	Slave 13 Channel 4 Low Byte							
8	Slave 14 Channel 1 High Byte							
9	Slave 14 Channel 1 Low Byte							
10	Slave 14 Channel 2 High Byte							
11	Slave 14 Channel 2 Low Byte							
12	Slave 14 Channel 3 High Byte							
13	Slave 14 Channel 3 Low Byte							
14	Slave 14 Channel 4 High Byte							
15	Slave 14 Channel 4 Low Byte							
…	…							
144	Slave 31 Channel 1 High Byte							
145	Slave 31 Channel 1 Low Byte							
146	Slave 31 Channel 2 High Byte							
147	Slave 31 Channel 2 Low Byte							
148	Slave 31 Channel 3 High Byte							
149	Slave 31 Channel 3 Low Byte							
150	Slave 31 Channel 4 High Byte							
151	Slave 31 Channel 4 Low Byte							

A.5.9 Data record 144 - Analog slave 17 - 31

Data record 144 enables acyclic reading and writing of analog data for slave addresses 17 to 31. The length of the data record is 120 bytes.
The addresses for the input and output data area are assigned via the call parameter "Data" in accordance with DP-V1. Please note the table "Call parameters for sending/receiving" in the section "Analog data via acyclic PROFIBUS DP services".

Table A-18 Structure of data record 144

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Slave 17 Channel 1 High Byte							
1	Slave 17 Channel 1 Low Byte							
2	Slave 17 Channel 2 High Byte							
3	Slave 17 Channel 2 Low Byte							
4	Slave 17 Channel 3 High Byte							
5	Slave 17 Channel 3 Low Byte							
6	Slave 17 Channel 4 High Byte							
7	Slave 17 Channel 4 Low Byte							
8	Slave 18 Channel 1 High Byte							
9	Slave 18 Channel 1 Low Byte							
10	Slave 18 Channel 2 High Byte							
11	Slave 18 Channel 2 Low Byte							
12	Slave 18 Channel 3 High Byte							
13	Slave 18 Channel 3 Low Byte							
14	Slave 18 Channel 4 High Byte							
15	Slave 18 Channel 4 Low Byte							
…	…							
112	Slave 31 Channel 1 High Byte							
113	Slave 31 Channel 1 Low Byte							
114	Slave 31 Channel 2 High Byte							
115	Slave 31 Channel 2 Low Byte							
116	Slave 31 Channel 3 High Byte							
117	Slave 31 Channel 3 Low Byte							
118	Slave 31 Channel 4 High Byte							
119	Slave 31 Channel 4 Low Byte							

A.5.10 Data record 145 - Analog slave 21 - 31

Data record 145 enables acyclic reading and writing of analog data for slave addresses 21 to 31. The length of the data record is 88 bytes.
The addresses for the input and output data area are assigned via the call parameter "Data" in accordance with DP-V1. Please note the table "Call parameters for sending/receiving" in the section "Analog data via acyclic PROFIBUS DP services".

Table A-19 Structure of data record 145

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Slave 21 Channel 1 High Byte							
1	Slave 21 Channel 1 Low Byte							
2	Slave 21 Channel 2 High Byte							
3	Slave 21 Channel 2 Low Byte							
4	Slave 21 Channel 3 High Byte							
5	Slave 21 Channel 3 Low Byte							
6	Slave 21 Channel 4 High Byte							
7	Slave 21 Channel 4 Low Byte							
8	Slave 22 Channel 1 High Byte							
9	Slave 22 Channel 1 Low Byte							
10	Slave 22 Channel 2 High Byte							
11	Slave 22 Channel 2 Low Byte							
12	Slave 22 Channel 3 High Byte							
13	Slave 22 Channel 3 Low Byte							
14	Slave 22 Channel 4 High Byte							
15	Slave 22 Channel 4 Low Byte							
…	…							
80	Slave 31 Channel 1 High Byte							
80	Slave 31 Channel 1 Low Byte							
82	Slave 31 Channel 2 High Byte							
83	Slave 31 Channel 2 Low Byte							
84	Slave 31 Channel 3 High Byte							
85	Slave 31 Channel 3 Low Byte							
86	Slave 31 Channel 4 High Byte							
87	Slave 31 Channel 4 Low Byte							

A.5.11 Data record 146 - Analog slave 25 - 31

Data record 146 enables acyclic reading and writing of analog data for slave addresses 25 to 31. The length of the data record is 56 bytes.
The addresses for the input and output data area are assigned via the call parameter "Data" in accordance with DP-V1. Please note the table "Call parameters for sending/receiving" in the section "Analog data via acyclic PROFIBUS DP services".

Table A-20 Structure of data record 146

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Slave 25 Channel 1 High Byte							
1	Slave 25 Channel 1 Low Byte							
2	Slave 25 Channel 2 High Byte							
3	Slave 25 Channel 2 Low Byte							
4	Slave 25 Channel 3 High Byte							
5	Slave 25 Channel 3 Low Byte							
6	Slave 25 Channel 4 High Byte							
7	Slave 25 Channel 4 Low Byte							
8	Slave 26 Channel 1 High Byte							
9	Slave 26 Channel 1 Low Byte							
10	Slave 26 Channel 2 High Byte							
11	Slave 26 Channel 2 Low Byte							
12	Slave 26 Channel 3 High Byte							
13	Slave 26 Channel 3 Low Byte							
14	Slave 26 Channel 4 High Byte							
15	Slave 26 Channel 4 Low Byte							
…	…							
48	Slave 31 Channel 1 High Byte							
49	Slave 31 Channel 1 Low Byte							
50	Slave 31 Channel 2 High Byte							
51	Slave 31 Channel 2 Low Byte							
52	Slave 31 Channel 3 High Byte							
53	Slave 31 Channel 3 Low Byte							
54	Slave 31 Channel 4 High Byte							
55	Slave 31 Channel 4 Low Byte							

A.5.12 Data record 147 - Analog slave 29 - 31

Data record 147 enables acyclic reading and writing of analog data for slave addresses 29 to 31. The length of the data record is 24 bytes.
The addresses for the input and output data area are assigned via the call parameter "Data" in accordance with DP-V1. Please note the table "Call parameters for sending/receiving" in the section "Analog data via acyclic PROFIBUS DP services".

Table A-21 Structure of data record 147

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Slave 29 Channel 1 High Byte							
1	Slave 29 Channel 1 Low Byte							
2	Slave 29 Channel 2 High Byte							
3	Slave 29 Channel 2 Low Byte							
4	Slave 29 Channel 3 High Byte							
5	Slave 29 Channel 3 Low Byte							
6	Slave 29 Channel 4 High Byte							
7	Slave 29 Channel 4 Low Byte							
8	Slave 30 Channel 1 High Byte							
9	Slave 30 Channel 1 Low Byte							
10	Slave 30 Channel 2 High Byte							
11	Slave 30 Channel 2 Low Byte							
12	Slave 30 Channel 3 High Byte							
13	Slave 30 Channel 3 Low Byte							
14	Slave 30 Channel 4 High Byte							
15	Slave 30 Channel 4 Low Byte							
16	Slave 31 Channel 1 High Byte							
17	Slave 31 Channel 1 Low Byte							
18	Slave 31 Channel 2 High Byte							
19	Slave 31 Channel 2 Low Byte							
20	Slave 31 Channel 3 High Byte							
21	Slave 31 Channel 3 Low Byte							
22	Slave 31 Channel 4 High Byte							
23	Slave 31 Channel 4 Low Byte							

A.5.13 Data record 150 - Binary image I/O data

Data record 150 enables acyclic reading of the binary input and output image of the AS-i master for HMI or diagnostics.

Table A-22 Structure of data record 150

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							
4	Reserved				Slave 1 / 1A input			
5	Slave 2 / 2A input				Slave 3 / 3A input			
6	Slave 4 / 4A input				Slave 5 / 5A input			
...	...				...			
19	Slave 30 / 30A input				Slave 31 / 31A input			
20	Reserved				Slave 1 / 1B input			
21	Slave 2 / 2B input				Slave 3 / 3B input			
22	Slave 4 / 4B input				Slave 5 / 5B input			
...	...				...			
35	Slave 30 / 30B input				Slave 31 / 31B input			
36	Reserved				Slave 1 / 1A output			
37	Slave 2 / 2A output				Slave 3 / 3A output			
38	Slave 4 / 4A output				Slave 5 / 5A output			
...	...				...			
51	Slave 30 / 30A output				Slave 31 / 31A output			
52	Reserved				Slave 1 / 1B output			
53	Slave 2 / 2B output				Slave 3 / 3B output			
54	Slave 4 / 4B output				Slave 5 / 5B output			
...	...				...			
67	Slave 30 / 30B output				Slave 31 / 31B output			

A.5.14 Data record 151 - Analog image O data slave 1 - 29

Data record 151 enables acyclic reading of the analog output values of the AS-i master for slave addresses 1 to 29.

Table A-23 Structure of data record 151

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							
4	Slave 1 Channel 1 High Byte							
5	Slave 1 Channel 1 Low Byte							
6	Slave 1 Channel 2 High Byte							
7	Slave 1 Channel 2 Low Byte							
8	Slave 1 Channel 3 High Byte							
9	Slave 1 Channel 3 Low Byte							
10	Slave 1 Channel 4 High Byte							
11	Slave 1 Channel 4 Low Byte							
12	Slave 2 Channel 1 High Byte							
13	Slave 2 Channel 1 Low Byte							
14	Slave 2 Channel 2 High Byte							
15	Slave 2 Channel 2 Low Byte							
16	Slave 2 Channel 3 High Byte							
17	Slave 2 Channel 3 Low Byte							
18	Slave 2 Channel 4 High Byte							
19	Slave 2 Channel 4 Low Byte							
...	...							
228	Slave 29 Channel 1 High Byte							
229	Slave 29 Channel 1 Low Byte							
230	Slave 29 Channel 2 High Byte							
231	Slave 29 Channel 2 Low Byte							
232	Slave 29 Channel 3 High Byte							
233	Slave 29 Channel 3 Low Byte							
234	Slave 29 Channel 4 High Byte							
235	Slave 29 Channel 4 Low Byte							

A.5.15 Data record 152 - Analog image I data slave 1 - 29

Data record 152 enables acyclic reading of the analog input values of the AS-i master for slave addresses 1 to 29.

Table A-24 Structure of data record 152

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							
4	Slave 1 Channel 1 High Byte							
5	Slave 1 Channel 1 Low Byte							
6	Slave 1 Channel 2 High Byte							
7	Slave 1 Channel 2 Low Byte							
8	Slave 1 Channel 3 High Byte							
9	Slave 1 Channel 3 Low Byte							
10	Slave 1 Channel 4 High Byte							
11	Slave 1 Channel 4 Low Byte							
12	Slave 2 Channel 1 High Byte							
13	Slave 2 Channel 1 Low Byte							
14	Slave 2 Channel 2 High Byte							
15	Slave 2 Channel 2 Low Byte							
16	Slave 2 Channel 3 High Byte							
17	Slave 2 Channel 3 Low Byte							
18	Slave 2 Channel 4 High Byte							
19	Slave 2 Channel 4 Low Byte							
...	...							
228	Slave 29 Channel 1 High Byte							
229	Slave 29 Channel 1 Low Byte							
230	Slave 29 Channel 2 High Byte							
231	Slave 29 Channel 2 Low Byte							
232	Slave 29 Channel 3 High Byte							
233	Slave 29 Channel 3 Low Byte							
234	Slave 29 Channel 4 High Byte							
235	Slave 29 Channel 4 Low Byte							

A.5.16 Data record 153 - Analog image O data slave 3 - 31

Data record 153 enables acyclic reading of the analog output values of the AS-i master for slave addresses 3 to 31.

Table A-25 Structure of data record 153

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							
4	Slave 3 Channel 1 High Byte							
5	Slave 3 Channel 1 Low Byte							
6	Slave 3 Channel 2 High Byte							
7	Slave 3 Channel 2 Low Byte							
8	Slave 3 Channel 3 High Byte							
9	Slave 3 Channel 3 Low Byte							
10	Slave 3 Channel 4 High Byte							
11	Slave 3 Channel 4 Low Byte							
12	Slave 4 Channel 1 High Byte							
13	Slave 4 Channel 1 Low Byte							
14	Slave 4 Channel 2 High Byte							
15	Slave 4 Channel 2 Low Byte							
16	Slave 4 Channel 3 High Byte							
17	Slave 4 Channel 3 Low Byte							
18	Slave 4 Channel 4 High Byte							
19	Slave 4 Channel 4 Low Byte							
...	...							
228	Slave 31 Channel 1 High Byte							
229	Slave 31 Channel 1 Low Byte							
230	Slave 31 Channel 2 High Byte							
231	Slave 31 Channel 2 Low Byte							
232	Slave 31 Channel 3 High Byte							
233	Slave 31 Channel 3 Low Byte							
234	Slave 31 Channel 4 High Byte							
235	Slave 31 Channel 4 Low Byte							

A.5.17 Data record 154 - Analog image I data slave 3 - 31

Data record 154 enables acyclic reading of the analog input values of the AS-i master for slave addresses 3 to 31.

Table A-26 Structure of data record 154

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							
4	Slave 3 Channel 1 High Byte							
5	Slave 3 Channel 1 Low Byte							
6	Slave 3 Channel 2 High Byte							
7	Slave 3 Channel 2 Low Byte							
8	Slave 3 Channel 3 High Byte							
9	Slave 3 Channel 3 Low Byte							
10	Slave 3 Channel 4 High Byte							
11	Slave 3 Channel 4 Low Byte							
12	Slave 4 Channel 1 High Byte							
13	Slave 4 Channel 1 Low Byte							
14	Slave 4 Channel 2 High Byte							
15	Slave 4 Channel 2 Low Byte							
16	Slave 4 Channel 3 High Byte							
17	Slave 4 Channel 3 Low Byte							
18	Slave 4 Channel 4 High Byte							
19	Slave 4 Channel 4 Low Byte							
...	...							
228	Slave 31 Channel 1 High Byte							
229	Slave 31 Channel 1 Low Byte							
230	Slave 31 Channel 2 High Byte							
231	Slave 31 Channel 2 Low Byte							
232	Slave 31 Channel 3 High Byte							
233	Slave 31 Channel 3 Low Byte							
234	Slave 31 Channel 4 High Byte							
235	Slave 31 Channel 4 Low Byte							

A.5.18 Data record 202 - Parameter/echo

Data record 202 supplies the comparison of the AS-i slave parameters stored in the configuration with the values (parameter echo) actually present in the AS-i slaves.

Table A-27 Structure of data record 202

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							
4	Slave 0 Parameter				Slave 0 Parameter echo			
5	Slave 1 / 1A Parameter				Slave 1 / 1A Parameter echo			
6	Slave 2 / 2A Parameter				Slave 2 / 2A Parameter echo			
7	Slave 3 / 3A Parameter				Slave 3 / 3A Parameter echo			
8	Slave 4 / 4A Parameter				Slave 4 / 4A Parameter echo			
...	...				...			
35	Slave 31 / 31A Parameter				Slave 31 / 31A Parameter echo			
36	Reserved				Reserved			
37	Slave 1B Parameter				Slave 1B Parameter echo			
38	Slave 2B Parameter				Slave 2B Parameter echo			
39	Slave 3B Parameter				Slave 3B Parameter echo			
…	…				…			
67	Slave 31B Parameter				Slave 31B Parameter echo			

A.5.19 Data record 203 - Read overall configuration

Data record 203 contains the extended overall configuration of the DP / AS-i F-Link:

- The list of active AS-i slaves (LAS). It specifies which of the connected AS-i slaves are activated
- The current configuration data of the connected AS-i slaves (I/O configuration and ID code)
- The current parameters of the AS-i slaves (actual parameters)
- The current flags

Table A-28 Structure of data record 203

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	Reserved							
5	Reserved							
6	LAS slave 0	LAS slave 1 / 1A	LAS slave 2 / 2A	LAS slave 3 / 3A	LAS slave 4 / 4A	LAS slave 5 / 5A	LAS slave 6 / 6A	LAS slave 7 / 7A
7	LAS slave 8 / 8A	LAS slave 9 / 9A	LAS slave 10 / 10A	LAS slave 11 / 11A	LAS slave 12 / 12A	LAS slave 13 / 13A	LAS slave 14 / 14A	LAS slave 15 / 15A
8	LAS slave 16 / 16A	LAS slave 17 / 17A	LAS slave 18 / 18A	LAS slave 19 / 19A	LAS slave 20 / 20A	LAS slave 21 / 21A	LAS slave 22 / 22A	LAS slave 23 / 23A
9	LAS slave 24 / 24A	LAS slave 25 / 25A	LAS slave 26 / 26A	LAS slave 27 / 27A	LAS slave 28 / 28A	LAS slave 29 / 29A	LAS slave 30 / 30A	LAS slave 31 / 31A
10	Reserved	LAS slave 1B	LAS slave 2B	LAS slave 3B	LAS slave 4B	LAS slave 5B	LAS slave 6B	LAS slave 7B
11	LAS slave 8B	LAS slave 9B	LAS slave 10B	LAS slave 11B	LAS slave 12B	LAS slave 13B	LAS slave 14B	LAS slave 15B
12	LAS slave 16B	LAS slave 17B	LAS slave 18B	LAS slave 19B	LAS slave 20B	LAS slave 21B	LAS slave 22B	LAS slave 23B
13	LAS slave 24B	LAS slave 25B	LAS slave 26B	LAS slave 27B	LAS slave 28B	LAS slave 29B	LAS slave 30B	LAS slave 31B
14	ID_CODE slave 0				I/O configuration slave 0			
15	Ext ID1 slave 0				Ext ID2 slave 0			
16	ID_CODE slave 1 / 1A				I/O configuration slave 1 / 1A			
17	Ext ID1 slave 1 / 1A				Ext ID2 slave 1 / 1A			
18	ID_CODE slave 2 / 2A				I/O configuration slave 2 / 2A			
19	Ext ID1 slave 2 / 2A				Ext ID2 slave 2 / 2A			
20	ID_CODE slave 3 / 3A				I/O configuration slave 3 / 3A			
21	Ext ID1 slave 3 / 3A				Ext ID2 slave 3 / 3A			
22	ID_CODE slave 4 / 4A				I/O configuration slave 4 / 4A			
23	Ext ID1 slave 4 / 4A				Ext ID2 slave 4 / 4A			
24	ID_CODE slave 5 / 5A				I/O configuration slave 5 / 5A			
25	Ext ID1 slave 5 / 5A				Ext ID2 slave 5 / 5A			
26	ID_CODE slave 6 / 6A				I/O configuration slave 6 / 6A			
27	Ext ID1 slave 6 / 6A				Ext ID2 slave 6 / 6A			
28	ID_CODE slave 7 / 7A				I/O configuration slave 7 / 7A			
29	Ext ID1 slave 7 / 7A				Ext ID2 slave 7 / 7A			
30	ID_CODE slave 8 / 8A				I/O configuration slave 8 / 8A			
31	Ext ID1 slave 8 / 8A				Ext ID2 slave 8 / 8A			
32	ID_CODE slave 9 / 9A				I/O configuration slave 9 / 9A			
33	Ext ID1 slave 9 / 9A				Ext ID2 slave 9 / 9A			
34	ID_CODE slave 10 / 10A				I/O configuration slave 10 / 10A			
35	Ext ID1 slave 10 / 10A				Ext ID2 slave 10 / 10A			
36	ID_CODE slave 11 / 11A				I/O configuration slave 11 / 11A			
37	Ext ID1 slave 11 / 11A				Ext ID2 slave 11 / 11A			
38	ID_CODE slave 12 / 12A				I/O configuration slave 12 / 12A			
39	Ext ID1 slave 12 / 12A				Ext ID2 slave 12 / 12A			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
40	ID_CODE slave 13 / 13A				I/O configuration slave 13 / 13A			
41	Ext ID1 slave 13 / 13A				Ext ID2 slave 13 / 13A			
42	ID_CODE slave 14 / 14A				I/O configuration slave 14 / 14A			
43	Ext ID1 slave 14 / 14A				Ext ID2 slave 14 / 14A			
44	ID_CODE slave 15 / 15A				I/O configuration slave 15 / 15A			
45	Ext ID1 slave 15 / 15A				Ext ID2 slave 15 / 15A			
46	ID_CODE slave 16 / 16A				I/O configuration slave 16 / 16A			
47	Ext ID1 slave 16 / 16A				Ext ID2 slave 16 / 16A			
48	ID_CODE slave 17 / 17A				I/O configuration slave 17 / 17A			
49	Ext ID1 slave 17 / 17A				Ext ID2 slave 17 / 17A			
50	ID_CODE slave 18 / 18A				I/O configuration slave 18 / 18A			
51	Ext ID1 slave 18 / 18A				Ext ID2 slave 18 / 18A			
52	ID_CODE slave 19 / 19A				I/O configuration slave 19 / 19A			
53	Ext ID1 slave 19 / 19A				Ext ID2 slave 19 / 19A			
54	ID_CODE slave 20 / 20A				I/O configuration slave 20 / 20A			
55	Ext ID1 slave 20 / 20A				Ext ID2 slave 20 / 20A			
56	ID_CODE slave 21 / 21A				I/O configuration slave 21 / 21A			
57	Ext ID1 slave 21 / 21A				Ext ID2 slave 21 / 21A			
58	ID_CODE slave 22 / 22A				I/O configuration slave 22 / 22A			
59	Ext ID1 slave 22 / 22A				Ext ID2 slave 22 / 22A			
60	ID_CODE slave 23 / 23A				I/O configuration slave 23 / 23A			
61	Ext ID1 slave 23 / 23A				Ext ID2 slave 23 / 23A			
62	ID_CODE slave 24 / 24A				I/O configuration slave 24 / 24A			
63	Ext ID1 slave 24 / 24A				Ext ID2 slave 24 / 24A			
64	ID_CODE slave 25 / 25A				I/O configuration slave 25 / 25A			
65	Ext ID1 slave 25 / 25A				Ext ID2 slave 25 / 25A			
66	ID_CODE slave 26 / 26A				I/O configuration slave 26 / 26A			
67	Ext ID1 slave 26 / 26A				Ext ID2 slave 26 / 26A			
68	ID_CODE slave 27 / 27A				I/O configuration slave 27 / 27A			
69	Ext ID1 slave 27 / 27A				Ext ID2 slave 27 / 27A			
70	ID_CODE slave 28 / 28A				I/O configuration slave 28 / 28A			
71	Ext ID1 slave 28 / 28A				Ext ID2 slave 28 / 28A			
72	ID_CODE slave 29 / 29A				I/O configuration slave 29 / 29A			
73	Ext ID1 slave 29 / 29A				Ext ID2 slave 29 / 29A			
74	ID_CODE slave 30 / 30A				I/O configuration slave 30 / 30A			
75	Ext ID1 slave 30 / 30A				Ext ID2 slave 30 / 30A			
76	ID_CODE slave 31 / 31A				I/O configuration slave 31 / 31A			
77	Ext ID1 slave 31 / 31A				Ext ID2 slave 31 / 31A			
78	Reserved				Reserved			
79	Reserved				Reserved			
80	ID_CODE slave 1B				I/O configuration slave 1B			
81	Ext ID1 slave 1B				Ext ID2 slave 1B			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
82	ID_CODE slave 2B				I/O configuration slave 2B			
83	Ext ID1 slave 2B				Ext ID2 slave 2B			
84	ID_CODE slave 3B				I/O configuration slave 3B			
85	Ext ID1 slave 3B				Ext ID2 slave 3B			
86	ID_CODE slave 4B				I/O configuration slave 4B			
87	Ext ID1 slave 4B				Ext ID2 slave 4B			
88	ID_CODE slave 5B				I/O configuration slave 5B			
89	Ext ID1 slave 5B				Ext ID2 slave 5B			
90	ID_CODE slave 6B				I/O configuration slave 6B			
91	Ext ID1 slave 6B				Ext ID2 slave 6B			
92	ID_CODE slave 7B				I/O configuration slave 7B			
93	Ext ID1 slave 7B				Ext ID2 slave 7B			
94	ID_CODE slave 8B				I/O configuration slave 8B			
95	Ext ID1 slave 8B				Ext ID2 slave 8B			
96	ID_CODE slave 9B				I/O configuration slave 9B			
97	Ext ID1 slave 9B				Ext ID2 slave 9B			
98	ID_CODE slave 10B				I/O configuration slave 10B			
99	Ext ID1 slave 10B				Ext ID2 slave 10B			
100	ID_CODE slave 11B				I/O configuration slave 11B			
101	Ext ID1 slave 11B				Ext ID2 slave 11B			
102	ID_CODE slave 12B				I/O configuration slave 12B			
103	Ext ID1 slave 12B				Ext ID2 slave 12B			
104	ID_CODE slave 13B				I/O configuration slave 13B			
105	Ext ID1 slave 13B				Ext ID2 slave 13B			
106	ID_CODE slave 14B				I/O configuration slave 14B			
107	Ext ID1 slave 14B				Ext ID2 slave 14B			
108	ID_CODE slave 15B				I/O configuration slave 15B			
109	Ext ID1 slave 15B				Ext ID2 slave 15B			
110	ID_CODE slave 16B				I/O configuration slave 16B			
111	Ext ID1 slave 16B				Ext ID2 slave 16B			
112	ID_CODE slave 17B				I/O configuration slave 17B			
113	Ext ID1 slave 17B				Ext ID2 slave 17B			
114	ID_CODE slave 18B				I/O configuration slave 18B			
115	Ext ID1 slave 18B				Ext ID2 slave 18B			
116	ID_CODE slave 19B				I/O configuration slave 19B			
117	Ext ID1 slave 19B				Ext ID2 slave 19B			
118	ID_CODE slave 20B				I/O configuration slave 20B			
119	Ext ID1 slave 20B				Ext ID2 slave 20B			
120	ID_CODE slave 21B				I/O configuration slave 21B			
121	Ext ID1 slave 21B				Ext ID2 slave 21B			
122	ID_CODE slave 22B				I/O configuration slave 22B			
123	Ext ID1 slave 22B				Ext ID2 slave 22B			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
124	ID_CODE slave 23B				I/O configuration slave 23B			
125	Ext ID1 slave 23B				Ext ID2 slave 23B			
126	ID_CODE slave 24B				I/O configuration slave 24B			
127	Ext ID1 slave 24B				Ext ID2 slave 24B			
128	ID_CODE slave 25B				I/O configuration slave 25B			
129	Ext ID1 slave 25B				Ext ID2 slave 25B			
130	ID_CODE slave 26B				I/O configuration slave 26B			
131	Ext ID1 slave 26B				Ext ID2 slave 26B			
132	ID_CODE slave 27B				I/O configuration slave 27B			
133	Ext ID1 slave 27B				Ext ID2 slave 27B			
134	ID_CODE slave 28B				I/O configuration slave 28B			
135	Ext ID1 slave 28B				Ext ID2 slave 28B			
136	ID_CODE slave 29B				I/O configuration slave 29B			
137	Ext ID1 slave 29B				Ext ID2 slave 29B			
138	ID_CODE slave 30B				I/O configuration slave 30B			
139	Ext ID1 slave 30B				Ext ID2 slave 30B			
140	ID_CODE slave 31B				I/O configuration slave 31B			
141	Ext ID1 slave 31B				Ext ID2 slave 31B			
142	Reserved				Parameter slave 1 / 1A			
143	Parameter slave 2 / 2A				Parameter slave 3 / 3A			
144	Parameter slave 4 / 4A				Parameter slave 5 / 5A			
145	Parameter slave 6 / 6A				Parameter slave 7 / 7A			
146	Parameter slave 8 / 8A				Parameter slave 9 / 9A			
147	Parameter slave 10 / 10A				Parameter slave 11 / 11A			
148	Parameter slave 12 / 12A				Parameter slave 13 / 13A			
149	Parameter slave 14 / 14A				Parameter slave 15 / 15A			
150	Parameter slave 16 / 16A				Parameter slave 17 / 17A			
151	Parameter slave 18 / 18A				Parameter slave 19 / 19A			
152	Parameter slave 20 / 20A				Parameter slave 21 / 21A			
153	Parameter slave 22 / 22A				Parameter slave 23 / 23A			
154	Parameter slave 24 / 24A				Parameter slave 25 / 25A			
155	Parameter slave 26 / 26A				Parameter slave 27 / 27A			
156	Parameter slave 28 / 28A				Parameter slave 29 / 29A			
157	Parameter slave 30 / 30A				Parameter slave 31 / 31A			
158	Reserved				Parameter slave 1B			
159	Parameter slave 2B				Parameter slave 3B			
160	Parameter slave 4B				Parameter slave 5B			
161	Parameter slave 6B				Parameter slave 7B			
162	Parameter slave 8B				Parameter slave 9B			
163	Parameter slave 10B				Parameter slave 11B			
164	Parameter slave 12B				Parameter slave 13B			
165	Parameter slave 14B				Parameter slave 15B			

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
166	Parameter slave 16B				Parameter slave 17B			
167	Parameter slave 18B				Parameter slave 19B			
168	Parameter slave 20B				Parameter slave 21B			
169	Parameter slave 22B				Parameter slave 23B			
170	Parameter slave 24B				Parameter slave 25B			
171	Parameter slave 26B				Parameter slave 27B			
172	Parameter slave 28B				Parameter slave 29B			
173	Parameter slave 30B				Parameter slave 31B			
174	Flag 1							
175	Flag 2							
176	Reserved							
...	.....							
220	Reserved							

Table A-29 Description of the flag contents of flag 1

Bit	Meaning	Description
0	OFFLINE_READY	The flag is set if the offline phase is active.
1	APF	The flag is set if the voltage on the AS-i cable is too low.
2	NORMAL_MODE	The flag is set when the DP / AS-i F-Link is in normal mode.
3	OPERATING MODE	The flag is set in configuring mode and reset in protected mode.
4	AUTO_ADDR_AVAIL	The flag is set if automatic address programming can be carried out (i.e. precisely **one** AS-i slave has currently failed).
5	AUTO_ADDR_ASSIGN	The flag is set if automatic address programming is possible (that is, AUTO_ADDR_ENABLE = 1 **and** no "incorrect" AS-i slave is connected to the AS-Interface).
6	LDS_0	The flag is set if an AS-i slave with operating address "0" is available.
7	CONFIG_OK	The flag is set when the planned configuration and the actual configuration agree.

Table A-30 Description of the flag contents of flag 2

Bit	Meaning	Description
0	OFFLINE	The flag is set if the operating status "OFFLINE" is to be adopted or has already been adopted.
1	INTERNAL	The flag is always set.
2	EEPROM_OK	The flag is set if the test of the internal EEPROM was successful.
3	AUTO_ADDR_ENABLE	The flag indicates whether automatic address programming by the user is disabled (BIT = 0) or enabled (BIT = 1).
4	PERIPHERY_FAULT	The flag is set if at least one AS-i slave signals an I/O fault.
5	Reserved	-
6	Reserved	-
7	MPO startup	The flag "Master_Power_on-startup" is set after the supply voltage of the AS-i slave master has been switched on. The bit is reset when the master changes later to OFFLINE.

A.5.20 Data record 205 - Read flags

Data record 205 reads current status information of the DP / AS-i F-Link via the flags.

Table A-31 Structure of data record 205

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	Meaning							
0	Reserved							
1	Reserved							
2	Reserved							
3	Reserved							
4	Flag 1							
5	Flag 2							

Table A-32 Description of the flag contents of flag 1

Bit	Meaning	Description
0	OFFLINE_READY	The flag is set if the offline phase is active.
1	APF	The flag is set if the voltage on the AS-i cable is too low.
2	NORMAL_MODE	The flag is set when the DP / AS-i F-Link is in normal mode.
3	OPERATING MODE	The flag is set in configuring mode and reset in protected mode.
4	AUTO_ADDR_AVAIL	The flag is set if automatic address programming can be carried out (i.e. precisely **one** AS-i slave has currently failed).
5	AUTO_ADDR_ASSIGN	The flag is set if automatic address programming is possible (that is, AUTO_ADDR_ENABLE = 1 **and** no "incorrect" AS-i slave is connected to the AS-Interface).
6	LDS_0	The flag is set if an AS-i slave with operating address "0" is available.
7	CONFIG_OK	The flag is set when the planned configuration and the actual configuration agree.

Table A-33 Description of the flag contents of flag 2

Bit	Meaning	Description
0	OFFLINE	The flag is set if the operating status "OFFLINE" is to be adopted or has already been adopted.
1	INTERNAL	The flag is always set.
2	EEPROM_OK	The flag is set if the test of the internal EEPROM was successful.
3	AUTO_ADDR_ENABLE	The flag indicates whether automatic address programming by the user is disabled (BIT = 0) or enabled (BIT = 1).
4	PERIPHERY_FAULT	The flag is set if at least one AS-i slave signals an I/O fault.
5	Reserved	-
6	Reserved	-
7	MPO startup	The flag "Master_Power_on-startup" is set after the supply voltage of the AS-i slave master has been switched on. The bit is reset when the master changes later to OFFLINE.

A.6 References

- /1/

  Kriesel, Werner R., Madelung, Otto W. (publisher):
  AS-Interface, The Actuator-Sensor-Interface for Automation,
  Carl Hanser Verlag Munich Wien 1999, ISBN 3-446-21064-4

- /2/

  AS-Interface Complete Specification

  Available on the Internet via AS-International Association e. V. at:

  http://www.as-interface.net

- /3/

  Catalog IK PI, SIMATIC NET Industrial Communication and Field Devices

  Available for free download on the Internet at:

  http://www.siemens.com/automation/infocenter

- /4/

  PROFIBUS, Profile Guidelines Part 1: Identification & Maintenance Functions, Order No.: 3.502

  Obtainable on the Internet via PROFIBUS International at:

  http://www.profibus.com/pb/

A.7 Additional support

You can currently find a FAQ collection and life-cycle-relevant customer announcements in the A&D Product Information System at:

http://www.siemens.com/lowvoltage/technical-assistance

A.8 Evaluation/feedback

Technical assistance A&D CD MM1 D-90327 Nuremberg-Moorenbrunn Fax: +49(911) 895-5907	
From Name: Department: City: Phone: Internet address:	Should you come across any printing errors when reading this publication, please notify us on this sheet. Suggestions for improvement are also welcome.

Evaluation of the manual "DP / AS-i F-Link"

Very good ☐ Good ☐ Not so good ☐

Because:

Time savings resulting from use of the document:

No savings ☐ Approx. 5% ☐ Approx. 10% ☐ Other.....%

Suggestions:

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GERMANY

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Supplements to the Manual

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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

with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION

without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE

indicates that an unintended result or situation can occur if the relevant information is not taken into account.

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

⚠ WARNING

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

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Disclaimer of Liability

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

Siemens AG
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

GWA 4NEB926253202-01
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Preface

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1.1 About this documentation (supplements)

Documentation

The product information on the DP AS-i F-Link can be found on the Internet at:

- http://support.automation.siemens.com/WW/view/en/3RK3141-1CD10/all
- http://support.automation.siemens.com/WW/view/en/3RK3141-2CD10/all

You can find detailed circuit diagram examples in the "Function Manual ASIsafe circuits for safety technology with AS-Interface safety monitor and DP/AS-i F-Link" on the Internet at:

- http://support.automation.siemens.com/WW/view/en/24509484

1.2 Product-specific safety notes (supplements)

Note

Category 4 according to EN 954-1 / SIL 3 according to IEC 61508 / PL e according to EN ISO 13849-1

The system has been tested and approved by the TÜV (German Technical Inspectorate). The transmission procedure for safety-related signals has been designed so that applications can be implemented up to Category 4 according to EN 954-1 / SIL 3 according to IEC 61508 / PL e according to EN ISO 13849-1.

Description 2

2.1 Area of application of the DP/AS-i F-Link (supplements)

2.1.1 Important notes

- In the case of an AS-i communication error (e.g. failure of an AS-i standard slave or ASIsafe slave), the DP/AS-i F-Link sends the substitute value "0" to the F controller for all safe inputs.
- The DP/AS-i F-Link cannot control safe AS-i outputs.
- Safe AS-i outputs cannot be operated on the AS-i line. This also applies if a safety monitor is operated simultaneously on the same AS-i line.
- Safe control of actuators is handled by the F controller, e.g. via safe SIMATIC output modules.
- As the AS-i master, the DP/AS-i F-Link can work together with an AS-Interface safety monitor independently of the F controller.

2.1.2 Additional properties

- Up to 62 AS-Interface slaves can be connected to the DP/AS-i F-Link.
- The DP/AS-i F-Link supports all AS-Interface master functions in accordance with AS-Interface specification V3.0.
- The DP/AS-i F-Link easily transfers non-safety-related input data/output data of all AS-i slaves as usual.
- The DP/AS-i F-Link has integral analog value transmission (all analog profiles).
- Problem-free access to the safety-related input data of ASIsafe slaves is possible via the DP/AS-i F-Link in the same way as on other SIMATIC F-I/O modules.
- Optimal TIA integration into STEP 7 via the Object Manager (OM) in the Simatic S7 HW Config.
- Use in machine tools under SINUMERIK 840 D (pl/sl) is possible.
- Integration into Engineering Tools from other vendors is possible via the PROFIBUS GSD file.

2.2 Prerequisites for use (supplements)

2.2.1 Prerequisites for configuring with STEP 7 and Object Manager

Before you can use the DP/AS-i F-Link for configuring STEP 7 and the Object Manager, the following requirements must be met:

- Object Manager OM F-Link Version V1.0 with Service Pack 2 or higher.
  It is strongly recommended that you always work with the latest version of the Object Manager. The free download and further information is available on the Internet at:
  http://support.automation.siemens.com/WW/view/en/24832949

For newer versions of the Object Manager, the following versions of the other software packages may differ.

- SIMATIC STEP 7, as of Version 5.4 with Service Pack 4
- For S7-300/416 F-CPU:
  - S7 Distributed Safety option package, as of Version V5.4 with Service Pack 3 (for Windows Vista: as of Version V5.4 Service Pack 4)
  - The S7 F ConfigurationPack is included in S7 Distributed Safety.
- For SINUMERIK 840Di sl:
  - Option package SAFETY INTEGRATED "SI-BASIC" or SAFETY INTEGRATED "SICOMFORT"
  - S7 F Configuration-Pack, as of Version V5.5 with Service Pack 1.
    The free download and further information is available on the Internet at:
    http://support.automation.siemens.com/WW/view/en/15208817

2.2.2 Requirements for configuring by using the GSD file

Before you use the DP/AS-i F-Link for configuring with GSD, the following requirements must be met:

- GSD file for DP/AS-i F-Link
  The free download can be found on the Internet at:
  http://support.automation.siemens.com/WW/view/en/113250
- For third-party controllers:
  - PLC-specific configuration tool
- For SIMATIC S7-300/416 F-CPU:
  - S7 Distributed Safety option package, as of Version V5.4 with Service Pack 3 (for Windows Vista: as of Version V5.4 Service Pack 4)
  - The S7 F-Configuration-Pack is included in S7 Distributed Safety.

2.2.3 Operating voltage AS-Interface

Operating voltage AS-Interface

The DP/AS-i F-Link 3RK3141-1CD10/ 3RK31412CD10, product version V1.0, is specified for operation with a rated voltage of 30 V on the AS-Interface cable. Operation with a reduced rated voltage of 24 V on the AS-Interface cable (AS-i Power24V) is not released.

Data exchange 4

4.1 Communication principle (supplements)

⚠ WARNING
Non-safe input data/output data and data sets must not be used for safety-related switching operations.

4.4 Safe data (PROFIsafe) (supplements)

4.4.1 Process image of the safe input data

Process image of the safe input data

Access to the safety-related input data (F-DI) of ASIsafe slaves is performed in the same way as with other SIMATIC F-I/O modules.

You can find further details in the following manuals:

- S7 Distributed Safety - Configuring and Programming
  The free download can be found on the Internet at:
  http://support.automation.siemens.com/WW/view/en/22099875
- Safety engineering in SIMATIC S7
  The free download can be found on the Internet at:
  http://support.automation.siemens.com/WW/view/en/12490443

To obtain the safe value "1" in the process image of the inputs, the following requirements must be met:

- Correct configuring and commissioning of the DP/AS-i F-Link
- Error-free AS-i bus (no configuration errors (CER) on the AS-i bus)
- Error-free data transmission (PROFIsafe, ASIsafe)
- Both input channels of the ASIsafe slave indicate the status "Contact closed" or "Safe signal present".
- The power-up condition of the two input channels of the ASIsafe slave is fulfilled.
  You can find more information in "Section 5.2.7.5 "ASIsafe" tab of the "Properties - AS-i F slave ..." dialog box" in the Section "Module parameters/reintegration following a discrepancy error".

Configuring 5

Note

The data relevant to configuration can also be found in the Chapter "Technical data (Page 19)".

5.2 Configuring with OM in STEP 7

5.2.5 “Properties DP/AS-i ..." dialog box (DP/AS-i module) (supplements)

5.2.5.3 "Operating Parameters" tab in the "Properties DP/AS-i -..." dialog box

Interrupt enable

If interrupt enable is active, diagnostic interrupts (OB82) are triggered in the following cases, for example:

- Discrepancy error or power-up condition is not met.
- Further conditions can be found in Section 5.2.5.3 "Operating Parameters" tab in the "Properties DP/AS-i -... " dialog box.

It must be noted that the DP/AS-i F-Link contains two internal modules (slots) that can each send diagnostic information via separate diagnostic message frames:

- Module 1: AS-i master (diagnostics via general AS-Interface operation)
- Module 2: F-Link (diagnostics via the safe evaluation of the ASIsafe slaves)

In addition to the diagnostics data, the diagnostics frame also contains the information about the slot from which the data originated so that the data can be interpreted correctly.

5.2.5.4 "AS-i Slaves Options" tab in the "Properties DP/AS-i -..." dialog box

Configuration of the AS-i slaves in the module

NOTICE
The DP/AS-i F-Link configuration must not contain any safe AS-i outputs. Slaves with the profile 6.B.D (IO.ID.ID2) must not be selected! A safe AS-i output is controlled using special code sequences that are rejected by the DP/AS-i F-Link during teach-in so that commissioning cannot be successfully completed.

5.2.7 “Properties - AS-i Slave ... (or AS-i F slave)" dialog box (supplements)

5.2.7.5 "ASIsafe" tab in the "Properties - AS-i F-Slave..." dialog box

Module parameters/reintegration after a discrepancy error

Following a discrepancy error, the interlocking state "Power-up condition not satisfied" is set for the relevant ASIsafe slave. The interlock is reset if a "0" signal has been detected again at both affected input channels of the ASIsafe slave (only with "2-out-of-2 evaluation" of the encoders). In the interlocking state, the safe input F-DI of the ASIsafe slave is maintained at the safe state "0".

The diagnostic information "Discrepancy error" and "Power-up condition not satisfied" can be read out from the diagnostic data set 92, see Appendix A.5.4 Data set 92 - Diagnostics.

Commissioning

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6.2 Starting up the DP/AS-i F-Link (supplements)

NOTICE
Code sequence error A code sequence error is not saved in the DP/AS-i F-Link. If the system should not start up again after a corrected code sequence error, you must program a corresponding interlock and restart condition in the fail-safe user program. A code sequence error can occur in the following cases: • Incorrect wiring of the input channels of the ASIsafe slave. • Corruption of the communication. • Cross-circuit of the input channels.

Service/diagnostics/remedies

8

8.1 Diagnostics via indicator LEDs and remedial measures

8.1.5 Fault and status indications of the SF LED and remedial measures (supplements)

Note

The interlocking state "Discrepancy error" or "Power-up condition not satisfied" is not indicated via the SF LED of the DP/AS-i F-Link. No special message is generated in the display for this purpose. The display shows "RUN" (if no further error exists).

If diagnostic interrupts are enabled, the SF LED of a higher-level SIMATIC S7 CPU lights up. The cause of the diagnostic interrupt can be determined via the PLC user program.

You can find further information about diagnostics in the Sections 8.3 "Diagnostics via the-diagnostic frame and remedial measures" and 8.4 "Using data sets for diagnostic information".
You can find further information on the parameter settings in the Sections 5.2.5.3 "Operating Parameters" tab in the "Properties - DP/AS-i ... " dialog box", and 5.3.3.3 GSD tab "Parameter Assignment".

8.3 Diagnostics via the diagnostic frame and remedial measures

8.3.3 System diagnostics via data set 1

Diagnostics data set 1 contains bytes 7 to 28 of the diagnostic frame (see Section 8.3.2 "Error and status messages of the diagnostic frame and remedial measures"). The data shows the following information:

- Error messages of the AS-i master
- List of faulty AS-i slaves

Diagnostics data set 1 can be read out in the SIMATIC system via SFC 59 or SFB 52. In addition, the identical information can also be determined by reading the S7 system status list (SSL) with SFC 51.

8.4 Using data records for diagnostics information

8.4.1 Device diagnostics using data set 92

Data set 92 provides comprehensive information:

- General operating state of the AS-i master
- Safety-related operating state of the AS-i master
- General operating state of the AS-i slaves
- Safety-related operating state of the AS-i slaves
- Evaluation of the safety-related signals from the ASIsafe slaves (e.g. discrepancy violation, power-up condition)

Data set 92 is described in Appendix A.5.4 "Data set 92 - Diagnostics".

Technical data

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9.6 Safety characteristics (supplements)

Table 9-1 Maximum achievable safety classes

Standard	Description	Value
IEC 61508	SIL	3
EN ISO 13849-1	PL	e
EN 954-1	Category	4

Table 9-2 Safety characteristics

Description	Description	Value
Probability of a dangerous failure in the case of an operating mode with high or continuous demand rate (high demand / continous mode)	PFH_D	$2.13 \cdot 10^{-9} \cdot 1 / h$ (see note/warning below)
Total value for AS-i system with DP/AS-i F-Link		
Individual value DP/AS-i F-Link	PFH_D	$1.13 \cdot 10^{-9} \cdot 1 / h$
Individual value AS-Interface Transmission procedure	PFH_D	$1.00 \cdot 10^{-9} \cdot 1 / h$
Individual value AS-Interface slave	PFH_D	0 (see note/warning below)
Proof-test interval	T1	20 years
Probability of a dangerous failure in the case of an operating mode with low demand rate (low demand)	PFD	$2.56 \cdot 10^{-5}$ (see note/warning below)
Total value for AS-i system with DP/AS-i F-Link		
Individual value DP/AS-i F-Link	PFD	$1.56 \cdot 10^{-5}$
Individual value AS-Interface Transmission procedure	PFD	$1.00 \cdot 10^{-5}$
Individual value AS-Interface slave	PFD	0 (see note/warning below)
Mean time to dangerous failure	$MTTF_d$	>= 100 years (1697 years) high (in accordance with EN ISO 13849-1)
Diagnostic coverage level	DC	> 99%
Common cause failure	CCF	74 points (requirements met, in accordance with EN ISO 138491)

⚠ WARNING

The value 0 as an approximation for the individual value AS-Interface slave only applies on the assumption that the PFH_D or PFD value of the AS-i slave is comparatively low and thus the PFH_D or PFD value of the AS-i slave does not make a significant contribution to the PFH_D or PFD value of the overall system.
Please refer in this regard to the technical data of the safe AS-i slaves and use the values specified by the manufacturer.

Remark:
The PFH value in Section 9.6, DP/AS-i F-Link Manual V1.0, Edition 10/2006 is invalid.

Notes on safety of machinery in factory automation can be found on the Internet at:
https://www.siemens.com/safety-evaluation-tool

9.7 Response times (supplements)

9.7.1 Monitoring and response time calculation

The Excel file S7fcotia.xls for S7 Distributed Safety is available on the Internet for supporting the approximate calculation of the runtime of the F runtime group, the minimal F monitoring time, and the maximum response time of the safety program:
http://support.automation.siemens.com/WW/view/en/25412441

You can find more information in the manual "Safety Engineering in SIMATIC S7"
The free download can be found on the Internet at:
http://support.automation.siemens.com/WW/view/en/12490443

Notes on completing the Excel file S7fcotia.xls (when used without IE/PB Link)

Tab "Max. runtime of the F runtime group"

Enter the number of F-Links (in the F runtime group under consideration) in the line "Fail-safe DP standard slaves" under F-I/O.

Tab "Min. F monitoring times"

In the section "Configuring the PROFIsafe monitoring time", select Variant 2 (distributed F-I/O via PROFIBUS DP) and use the values from the following table.

Table 9-3 Values for calculating the minimum F monitoring times

Description	Description	Value
Max. response time of the distributed I/O system (F-Link corresponds here to the IM)	T_Slave (IM)	29 ms
Max. acknowledgment time for the F-I/O (F-Link)	T_DAT	12 ms
F-I/O with inputs and outputs	-	No

Tab "Max. response times"

In the section "Input", select Variant 2 for the safety function signal flow under consideration (distributed F-I/O via PROFIBUS DP) and use the values from the following table.

Table 9-4 Values for calculating the max. response times

Description	Description	Value
Max. discrepancy time of the F-Link (Note: During the discrepancy time, the F-Link returns the safe value 0)	T_DIS	0
Max. response time of the F-Link in error-free operation	T_WCDT	23 ms
Max. response time of the F-Link when a fault occurs	T_OFDT	29 ms
Max. acknowledgment time for the F-I/O (F-Link)	T_DAT	12 ms
Configured PROFIsafe monitoring time	T_PSTO, conf.	F_WD_TIME (see setting on the PROFISAFE tab of the Properties dialog box of the DP slave of the F-Link)
Max. response time of the distributed I/O system (F-Link corresponds here to the IM)	T_Slave (IM)	29 ms

Note

The max. response time of the F-Link already contains the cycle time of the AS-i bus system.

⚠ WARNING

Increased response time

A signal delay within safe AS-i input slaves has a cumulative effect on the maximum response time.

Please note the technical data of the safe AS-i input slaves in this regard.

⚠ WARNING

Increased response time

A configured input delay greater than 0 ms has a cumulative effect on the maximum response time.

Note here Section 5.2.7.5 "ASIsafe" tab in the "Properties - AS-i F slave ... " dialog box in Chapter 5 "Configuring".

9.7.2 Response times of the F-Link (without higher-level system)

If you consider only the processing times within the F-Link, without further processing of the safe data in the higher-level system, the response times as shown in the following table result.

Table 9-5 Response times of the F-Link (without further processing)

Description	Value
Maximum response time in error-free operation	52 ms
Maximum response time when a fault occurs	58 ms

Remark:
The maximum response time values in Section 9.7, DP/AS-i F-Link Manual V1.0, Edition 10/2006, are invalid.

Note

The max. response time of the F-Link already contains the cycle time of the AS-i bus system.

⚠ WARNING

Increased response time

A signal delay within safe AS-i input slaves has a cumulative effect on the maximum response time.

Please note the technical data of the safe AS-i input slaves in this regard.

⚠ WARNING

Increased response time

A configured input delay greater than 0 ms has a cumulative effect on the maximum response time.

Note here Section 5.2.7.5 "ASIsafe" tab in the "Properties - AS-i F slave ... " dialog box in Chapter 5 "Configuring".