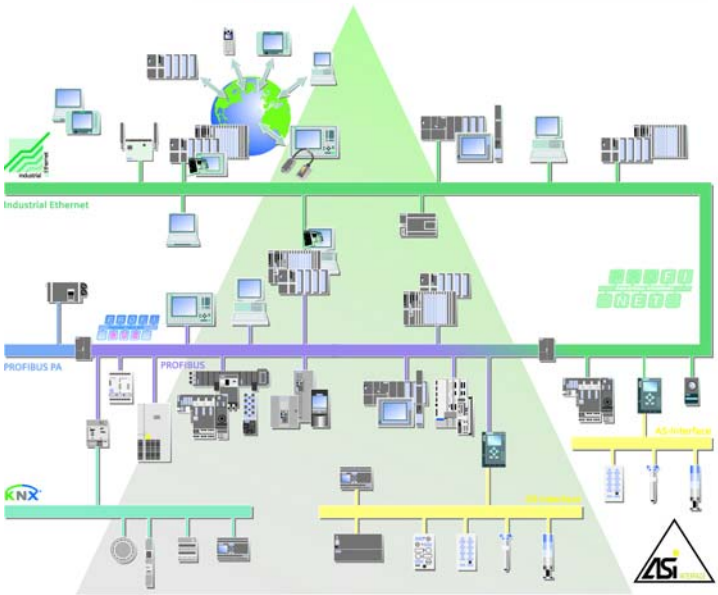
SIEMENS

SIMATIC NET

IE/AS–INTERFACE LINK PN IO

as of hardware version 1, as of firmware version V2.0

Manual



Release 03/2008
C79000–G8976–C216–03

Classification of the Safety−Related Notices

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:

Danger

indicates that death, severe personal injury **will** result if proper precautions are not taken.

Warning

indicates that death, severe personal injury **can** result if proper precautions are not taken.

Caution

with warning triangle indicates that minor personal injury can result if proper precautions are not taken.

Vorsicht

without warning triangle indicates that damage to property can result if proper precautions are not taken.

Notice

indicates that an undesirable result or status can occur if the relevant notice is ignored.

Note

highlights important information on the product, using the product, or part of the documentation that is of particular importance and that will be of benefit to the user.

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Safety Instructions Regarding your Product

Before you use the product described here, read the safety instructions below thoroughly.

Qualified Personnel

Only **qualified personnel** should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage of Hardware Products

Note the following:

Warning

This device and its components 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.

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 use the supplied sample programs or programs you have written yourself, make certain that no injury to persons nor damage to equipment can result in your plant or process.

EC Notice: Commissioning must not be carried out until it has been established that the machine in which this component is to be installed complies with the conditions of directive 98/37/EC.

Correct Usage of Software Products

Note the following:

Warning

This software may only be used for the applications described in the catalog or the technical description, and only in connection with devices or software products from other manufacturers which have been approved or recommended by Siemens.

Before you use the supplied sample programs or programs you have written yourself, make certain that no injury to persons nor damage to equipment can result in your plant or process.

Prior to Startup

Before putting the product into operation, note the following:

Vorsicht

Prior to startup you must observe the instructions in the relevant documentation. For ordering data of the documentation please refer to the catalogs or contact your local SIEMENS representative.

Disclaimer

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Technical data subject to change.

Preface

Purpose of the Manual

This manual supports you when using the **IE/AS-INTERFACE LINK PN IO** module. The product name is also shortened to **IE/AS-i LINK** in the manual. It contains information about how PROFINET IO controllers can address AS-i actuators and AS-i sensors via this module.

Validity of the Manual

This manual is valid for the IE/AS-INTERFACE LINK PN IO module as of hardware version 1 and as of firmware version V2.0 and the STEP 7 configuration software as of V5.4 SP3 / NCM PC as of V5.4 SP3.

What's new?

This issue of the manual includes several corrections.

We recommend the following procedure

... If you want an overall picture of the AS-Interface:

- First read the 'AS-Interface Introduction and Basic Information' manual (not part of this documentation package). This contains general information about the **AS-Interface**, abbreviated to **AS-i** in the following chapters.

... If you want to set up an AS-i system and include the IE/AS-i LINK in it:

- You will find the information you require about connecting and operating the IE/AS-i LINK in Chapter 1 and 3.

... If you want to know how to operate the IE/AS-i LINK from the point of view of the PROFINET IO
controller:

- Read Chapters 5 – 6 in this manual.
- Chapter 8 explains the data record interface.

Requirements

To understand this manual, you require the following:

- A working knowledge of PROFINET IO
- Knowledge of the manual 'AS-Interface Introduction and Basic Information'

Data medium with GSDML file

You require the GSDML file to configure IE/AS-i LINK and it is supplied on the accompanying CD (see Chapter 6).

Symbols used in the manual

You will find this symbol in Chapter 5 where it is used to identify the description of menu sequences on the display and keyboard.

FAQs

You will find FAQs on Siemens AS−i products on the Internet on the Service and Support pages of Industry Automation at the following address:

http://support.automation.siemens.com/WW/view/en/10805888

❑

Contents

1 Technical Description, Installation Guidelines, Operation

This chapter...

This chapter will familiarize you with the performance characteristics, basic functions and installation of the IE/AS-INTERFACE LINK PN IO master module.

You will learn the following:

- How to install the IE/AS-i LINK
- Which display and control elements the IE/AS-i LINK provides.

1.1 General Notes on Operation – Safety Warnings

Warning

WARNING – EXPLOSION HAZARD: DO NOT DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

Warning

When used under hazardous conditions (zone 2), devices of the IE/AS-INTERFACE LINK PN IO product line must be installed in an enclosure.

To comply with ATEX95 (previously ATEX100a) EN 60079-15, this enclosure must meet the requirements of at least IP54 in compliance with EN 60529.

Warning

When used under hazardous conditions:

- If the temperature of the cable or wiring entry point exceeds 70°C or the temperature of the connecting terminal on the IE/AS-i LINK exceeds 80 °C, special precautions must be taken:
  If the IE/AS-i LINK is operated at ambient temperatures 50°C to 60°C, only cables with a maximum permitted temperature of at least 80°C may be used.
- Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40%.
  This criterion is fulfilled, if supplies are derived from SELV (Safety Extra Low Voltage), only.
- The IE/AS-i LINK is intended only for vertical installation.

Warning

- ”WARNING” – Explosion Hazard – Do not disconnect while circuit is live unless area is known to be non-hazardous.
- ”WARNING” – Explosion Hazard – Substitution of components may impair suitability for Class I, Division 2 or Zone 2.
- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D; Class I, Zone 2, Group IIC or non-hazardous locations.

Caution

When handling and installing the IE/AS-INTERFACE LINK PN IO, make sure that you adhere to the ESD guidelines.

Note

The IE/AS-i LINK can be configured, installed and started up independent of the PROFINET installation.

1.2 Uses of the Module

PROFINET IO Device and AS-Interface Master

The IE/AS-i LINK is both a PROFINET IO device and AS-Interface master:

- IE/AS-i LINK connects the actuator-sensor interface with PROFINET IO.
- Using the IE/AS-i LINK module, you can access the inputs and outputs of the AS-i slaves from PROFINET IO Depending on the slave type, you can access binary values and / or analog values.

  The following AS-i slaves can be used:

  – Standard slaves / analog slaves / combi slaves

  – Slaves with the extended addressing mode

  – Slaves with data transfer mechanisms complying with the AS-i specification V3.0 – Combined Transaction Type (CTT) 1–5.

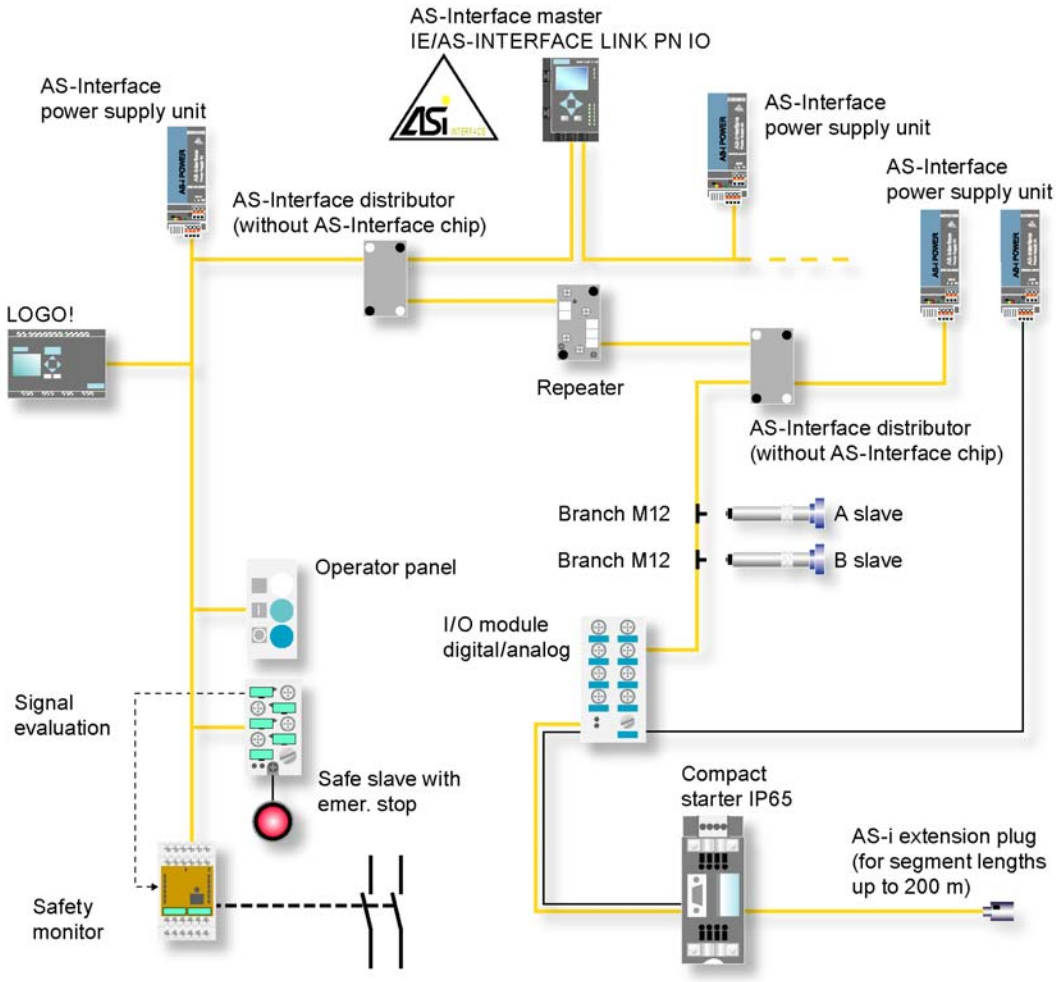


Figure 1-1 Example of a System Configuration with the IE/AS-INTERFACE LINK PN IO (double master)

Features

The IE/AS-INTERFACE LINK PN IO is a PROFINET device (complying with IEC 61158) and AS-Interface master (complying with the AS-Interface specification V3.0 according to EN 50 295) and allows transparent data access to the AS-Interface from PROFINET IO.

PROFINET IO controllers can exchange IO data cyclically with the lower-level AS-Interface slaves. Acyclic services can also be used for AS-i calls (parameters, diagnostics).

Apart from the digital I/O data, analog data is also stored quickly in the cyclic I/O area of an S7-300/400 CPU (no separate communication block call necessary).

The IE/AS-i LINK is available as a single or double master
(applications with large numbers of slaves –> doubles the configuration limits).

The complete underlying AS-i line can be configured on an integrated operator display in the IE/AS-i LINK (for example addressing the AS-i slaves, I/O test of all digital and analog slaves).

During operation, you have detailed diagnostic information available on the display allowing a fault to be localized immediately, when necessary.

The essential features are as follows:

- Single and double AS-Interface master (complying with AS-Interface specification V3.0) for the connection of 62 AS-Interface slaves per master and integrated analog value transfer
- Support of the real-time function (RT) of PROFINET IO
- Integrated ground fault monitoring for the AS-Interface cable
- Convenient diagnostics and commissioning on site using full graphics display or over Web interface with standard browser
- Configuration with STEP 7 or integration using the PROFINET type file (GSDML file)
- Vertical integration (standard Web interface) over Industrial Ethernet
- Power supply from the AS-Interface cable (line 1), therefore no extra power supply necessary. As an alternative, a 24 V DC power supply can be used.
- Module replacement without PG by using C-PLUG

Components of the Product

The IE/AS-i LINK product includes the following components:

- IE/AS-INTERFACE LINK PN IO
- Product information for the IE/AS-INTERFACE LINK PN IO
- Data media (documentation; GSDML file)

1.3 Technical Specifications of the Module

The IE/AS-INTERFACE LINK module has the following technical data:

Table 1-1 Technical Specifications

Feature	Explanation/Values
AS-i cycle time (The values apply to the maximum possible configuration of the IE/AS-INTERFACE LINK)	• 5 ms with 31 standard slaves • 10 ms with 62 standard slaves • 10 ms for inputs according to profile S-7.A.7 • 20 ms for outputs according to profile S-7.A.7 • 40 ms for inputs/outputs according to profile S-7.A.A • 20 ms for fast analog according to profile S-7.A.8 and S-7.A.9 • 5 ms for super fast analog according to profile S-6.0.X
Configuration of the AS-Interface	• via keyboard and display • using STEP 7 or with GSDML file • using Web Based Management (WBM) • using the user program (data record interface)
Supported AS-i master profiles	M1-M4
Connector for AS-i cable (single and double master)	over plug-in screw contacts (4-pin); Permitted current loading from pin 1 to pin 3 or pin 2 to pin 4, maximum 3 A
LAN connectors (2)	RJ-45 (10/100 Mbps) as equal switch ports with full duplex capability
Setting of PROFINET device name and IP parameters	Setting: • via keyboard and display • using STEP 7 • using Web Based Management (WBM)
Power supply from the AS-i cable (line 1) Current consumption from the AS-i cable Power consumption Cable length Cable cross-section (AS-i cable)	29.5 to 31.6 V DC in compliance with EN 50 295 max. 320 mA at 30 V max. 9.6 W max. 100 m 2 x 1.5 mm^2 (2 x 0.8 mm^2)
Optional external power supply (plug-in screw contacts 3-pin) Cable cross-section (power supply)	24 V DC, functional earthing (18 – 32 V DC) SELV / LPS or NEC Class 2 is mandatory. 0.5 to 2.5 mm^2
Ambient conditions • Operating temperature (vertical installation only) • Transportation and storage temperature • Operating altitude	 0 to +60°C –30°C to +70°C max. 3000 m above sea level

Table 1-1 Technical Specifications

Feature	Explanation/Values
• Relative humidity	Max. 95% at +25°C
Construction	
• Type of protection	IP 20
• Dimensions (W x H x D) in mm	90 x 132 x 85.5
• Weight	approx. 380 g
Receptacle for optional C-PLUG	
Full graphics display and 6 control buttons	128 x 64 pixels

1.4 Approvals

Table 1-2 Description of the Approvals

c–UL–us	UL 508
	CSA C22.2 No. 142
c–UL–us for hazardous locations	UL 1604, UL 2279PT.15 CL. 1, Div. 2 GP.A.B.C.D T4 CL. 1, Zone 2, GP.IIC, T4 CL. 1, Zone 2, AEx nC IIC T4
FM	FM 3611 CL. 1, Div. 2 GP.A.B.C.D T4 CL. 1, Zone 2, GP.IIC. T4 Ta: 0...+60°C
C–TICK	AS/NZS 2064 (Class A)
CE	EN 61000–6–2, EN 61000–6–4 (replaces EN 50081–2)
ATEX Zone 2	EN 60079–15:2005, EN 60079–0:2006 II 3 G EEx nA II T4 KEMA 08 ATEX 0003X

Note

The current approvals are printed on the module.

1.5 Installation Guidelines and Installing the Module

Caution

Noise immunity / grounding

To ensure the immunity of the IE/AS-INTERFACE LINK PN IO, the IE/AS-i LINK, the AS-i power supply unit and the power supply of the IE/AS-i LINK must be grounded according to the regulations.

Notice

If you do not adhere to the EMC directive 2004/108/EC (CE) when setting up systems and devices, this can lead to connection aborts in communication between the PROFINET IO controller and the IE/AS-INTERFACE LINK PN IO.

Possibilities

The IE/AS-i LINK has type of protection IP 20.

You can install the IE/AS-i LINK on a standard rail (DIN rail complying with EN 50022).

Ground the DIN rail over as short a distance as possible and with low inductance.

If the rail is installed in a cabinet, make sure that it makes good contact over a large area with the grounded mounting plate.

Installation on a DIN Rail

If you decide to install a module on a DIN rail, please note the following points:

1. The module is placed on the rail from above and then pushed down until the catch at the bottom of the module snaps into position.
2. Other modules can be arranged to the left and right of the module.

Removing the Module from the DIN Rail

To remove the module from the DIN rail, follow the procedure below:

1. When removing the module from the DIN rail, the power supply and signal cables must first be removed.
2. After the cables have been disconnected, press down the catch on the base of the device using a screwdriver and pull the module out of the rail towards the top.

Convection

Make sure that you leave at least 5 cm clearance above and below the module to allow heat dissipation.

Vorsicht

The DIN rail may only be installed horizontally.

The IE/AS-i LINK must be mounted vertically to ensure the required heat dissipation through the ventilation openings and at the top of the device.

1.6 Front Panel – Access to all Functions

Connection, Display and Control Elements

On the front panel, you have access to all the connection, display and control elements of the IE/AS-i LINK module.

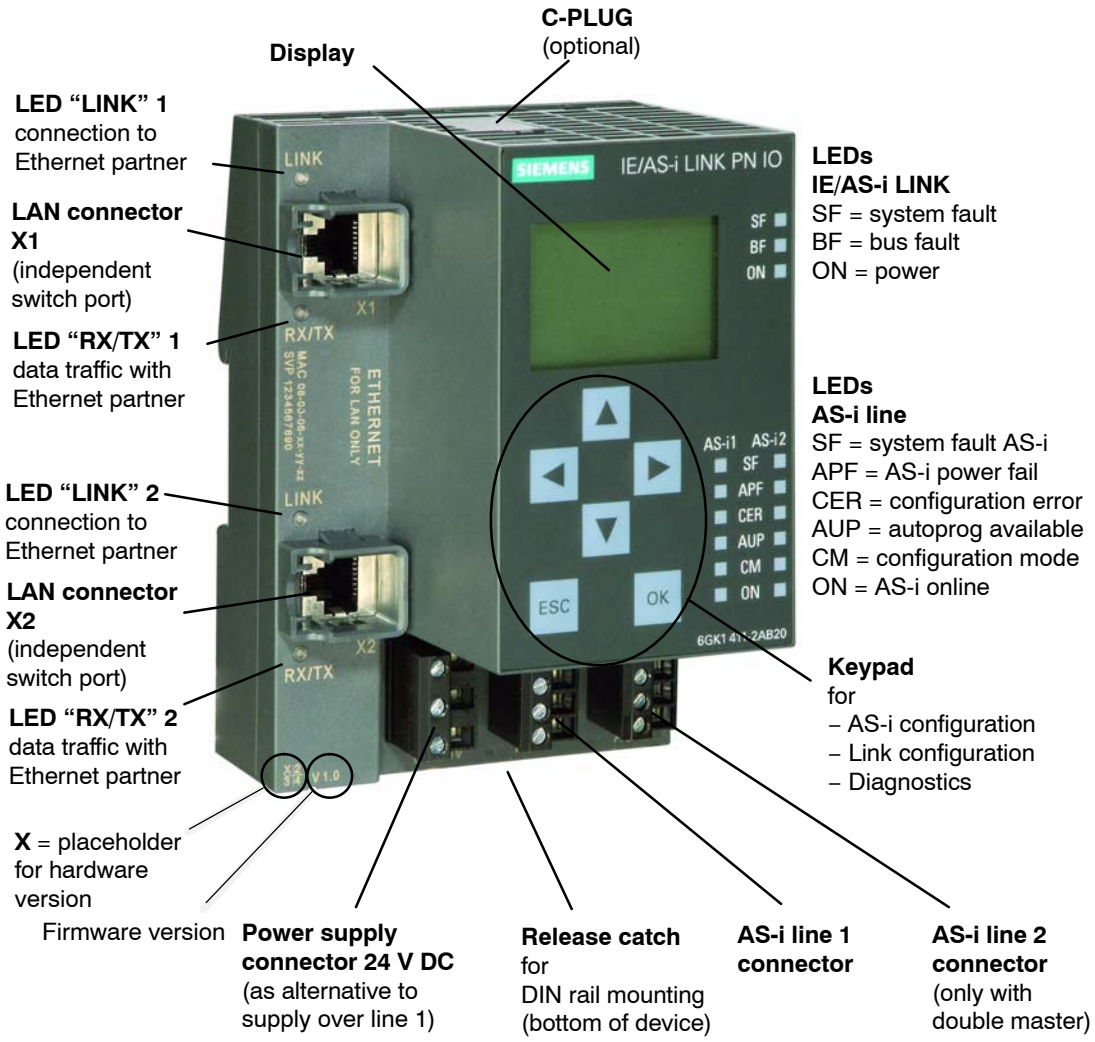


Figure 1-2 Front View of the IE/AS-INTERFACE LINK PN IO

1.7 Connection Elements

Connectors

The IE/AS-i LINK has the following connectors:

- Two separate connectors for the AS-i cable (on double master)
- One connector for alternative power supply 24 V DC (optional) and functional earthing
- Two RJ-45 LAN connectors as independent switch ports

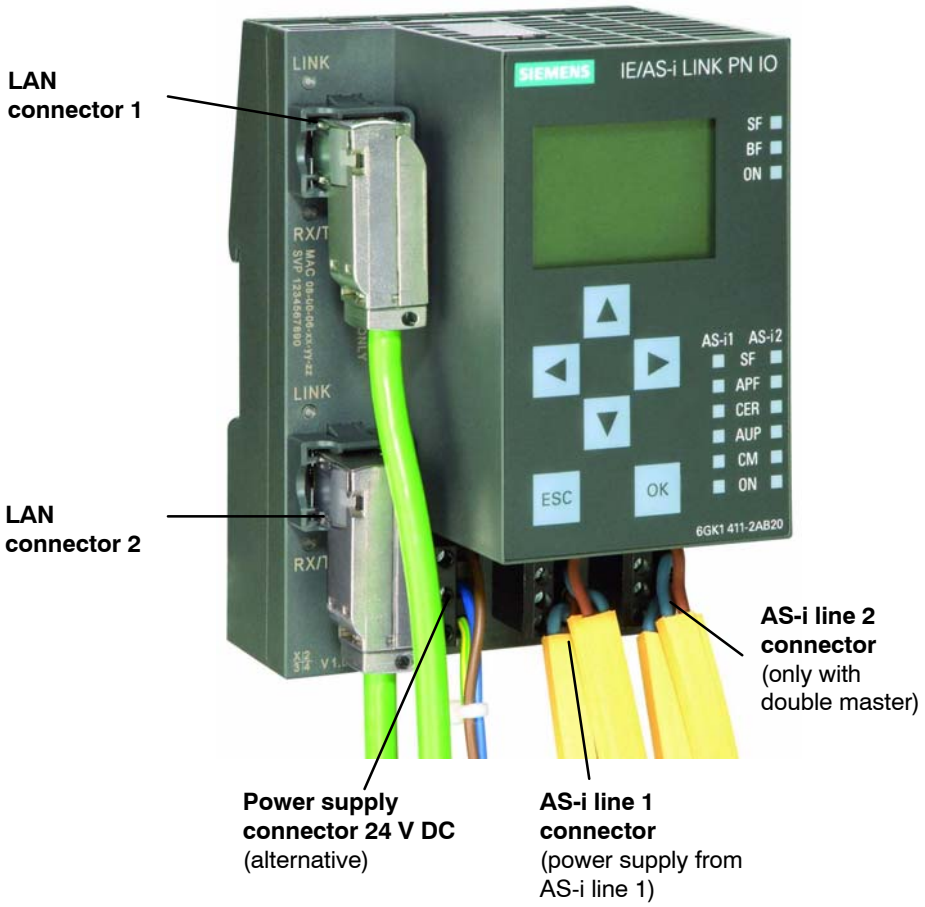


Figure 1-3 Connectors for the AS-i Cable(s) and Power Supply

1.7.1 Connectors for the AS-i Cable(s) and Power Supply

Caution

When connecting up the module, keep to the installation guidelines in Section 1.5.

Caution

The IE/AS-INTERFACE LINK PN IO may only be connected when the AS-i power supply unit is turned off.

Connectors for the AS-i Cable(s)

The IE/AS-i LINK has two connectors for the AS-i cables (line 1 and line 2). Each is connected over a 4-pin plug with two + and two – contacts that are jumpered internally.

This allows the IE/AS-i LINK to be looped into the AS-i cable.

Caution

The permitted current loading of the AS-i connection contacts is 3 A. If this value is exceeded on the AS-i cable, the IE/AS-INTERFACE LINK PN IO must not be looped into the AS-i cable but must be connected with a tap line (only one pair of connectors of the IE/AS-i LINK is used).

Pin assignment of the AS-i line

PIN no. line 1	Signal
1	AS-i 1 +
2	AS-i 1 –
3	AS-i 1 +
4	AS-i 1 –

PIN no. line 2	Signal
1	AS-i 2 +
2	AS-i 2 –
3	AS-i 2 +
4	AS-i 2 –

Pins 1 and 3 and pins 2 and 4 are jumpered internally.

Power Supply from the AS−Interface

Caution

The AS-i power supply unit used and the optional external power supply must provide an extra low voltage safely isolated from the mains supply. This safe isolation can be implemented according to the following requirements:

- VDE 0100 Part 410 = HD 384-4-4 = IEC 364-4-41
  (as functional extra-low voltage with safe isolation) or
- VDE 0805 = EN60950 = IEC 950
  (as safety extra-low voltage SELV) or
- VDE 0106 Part 101

The IE/AS-i LINK can be supplied fully from the AS-Interface (only AS-i line 1). The current consumption from the AS-Interface is 320 mA at 30 V.

As an alternative, the IE/AS-i LINK can be supplied by a separate power supply unit (24 V DC).

Power Supply from external Power Supply

Warning

The device is designed for operation with safety extra−low voltage (SELV). This means that only safety extra−low voltages (SELV) complying with IEC950/EN60950/ VDE0805 may be connected to the power supply terminals.

The power unit for supplying the device must comply with NEC Class 2 as described by the National Electrical Code(r) (ANSI/NFPA 70).

The power of all connected power units in total must correspond to a limited power source (LPS).

Never operate the IE/AS-INTERFACE LINK PN IO with AC current or DC current higher than 32 V.

With a double master, you require a separate power unit each for AS−i line 1 + 2.

If the cable to the external power unit is very long and liable to energy spikes, connect a surge protection element.

Pin assignment of the power supply

PIN no. line 1	Signal
1	Power +
2	Power −
3	PE

Note

Functional earthing
IE/AS-INTERFACE LINK PN IO has a connector for functional earthing. This connector is required if the integrated ground fault monitoring is used. It should be connected to the PE conductor with as little resistance as possible.

LAN Connectors (PROFINET IO, PC with WBM)

As connectors for PROFINET and a PC (or network) there are two RJ-45 jacks (recommendation: 90° FC connector).

One LAN connector is intended for the PROFINET system, the second LAN connector of the IE/AS-i LINK is used, for example, for configuration with Web Based Management and for diagnostics. The two LAN connectors have equal status.

The IE/AS-i LINK supports autocrossing, in other words, both crossover and straight-through cables can be used.

Pin Assignment of the LAN Connector

Pin no.	Signal
1	RXP
2	RXN
3	TXP
4	n.c.
5	n.c.
6	TXN
7	n.c.
8	n.c.

n.c. = not connected

1.8 C-PLUG (Configuration Plug)

Area of Application

The C-PLUG (order number: 6GK1 900-0AB00) is an optional exchangeable medium for saving the configuration and project engineering data of the basic device (IE/AS-i LINK) and the AS-i slaves.

When powered down, the C-PLUG retains all data permanently. This means that configuration data remains available when a basic device is replaced (module replacement without PG is therefore possible).

The C-PLUG is accessible from the top of the housing.

The IE/AS-i LINK has internal memory for permanent storage of the configuration data of the basic device and the AS-i slaves. Replacing a module without a PG is, however, possible only with the C-PLUG.

Inserting in the C-PLUG Slot

The slot for the C-PLUG is on the top panel of the device.

To insert the C-PLUG, the cover of the receptacle must be removed. The C-PLUG is inserted in the receptacle. The cover must then be replaced over the receptacle and closed correctly.

Notice

The C-PLUG may only be inserted or removed when the power is off!

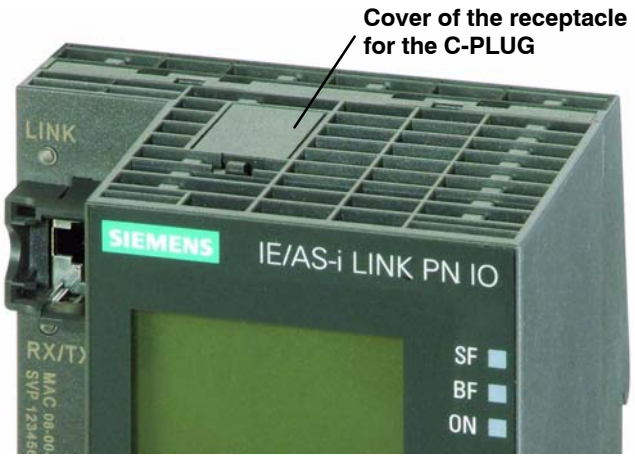


Figure 1-4 Position of the C-PLUG (removing the C-PLUG from the device with a screwdriver)

Function

If an empty C-PLUG (as supplied) is inserted, all the configuration data of the IE/AS-i LINK is written to it when the device starts up. Changes to the configuration during operation are also written automatically to the C-PLUG.

If the C-PLUG is inserted, the basic device automatically uses the configuration data of the C-PLUG. This assumes that the data was written by a compatible device type.

If a fault occurs, the basic device can then be replaced much faster and more simply. If a device needs to be replaced, the C-PLUG is simply taken from the failed component and inserted in the replacement. As soon as it starts up, the replacement automatically has the same device configuration as the failed device.

Notice

If a C-PLUG is inserted when you reset to the factory settings, the factory settings are stored on the C-PLUG !

Using the C-PLUG

When using a C-PLUG, the following situations must be distinguished:

- Inserting an empty C-PLUG:

  The IE/AS-i LINK detects when a C-PLUG is inserted and automatically writes the data of the internal memory to the C-PLUG.

- Inserting a C-PLUG of a different device type:

  If you insert a C-PLUG that is not intended for the IE/AS-i LINK, this can also be used. The IE/AS-i LINK signals an error and changes to the error state (WBM and display, see also Section 5.2.7).
  To clear the problem, the message must be acknowledged. At the same time, this triggers the transfer of the data from the internal memory to the C-PLUG.

- Inserting the C-PLUG of another IE/AS-i LINK:

  If a C-PLUG with valid data of another IE/AS-i LINK is inserted, the device changes to operational (starts up with the data of the C-PLUG). The data from the internal memory is, however, not transferred automatically to the C-PLUG. The transfer must be triggered manually using the keypad and display (or WBM) (System > Configuration > C-PLUG > Internal memory > C-PLUG; see Section 4.4). The next time the module starts up, the internal memory is deleted.

1.9 Display and Control Elements

LED Displays

The following LED displays are located on the front panel of the IE/AS-i LINK:

- Displays for the LAN connectors (separate for X1 and X2)
  - LINK: Connection to Ethernet partner
  - RX/TX: Data traffic

- Displays of the IE/AS-i LINK
  - SF: system fault
  - BF: bus fault
  - ON: Power supply IE/AS-i LINK

- Displays for the AS-i line
  - SF: AS-i system fault
  - APF: AS-i power fail
  - CER: configuration error
  - AUP: automatic address programming
  - CM: configuration mode
  - ON: AS-i status online / offline

Meaning of the IE/AS-i LINK LEDs

LED (color)	Status	Meaning
SF (red)	System fault (link)	The LED is lit in the following situations: • In protected mode, a diagnostic interrupt (entering state) was triggered on the PROFINET IO controller. • The IE/AS-i LINK has detected an internal error (for example EEPROM defective).
BF (red)	Bus fault	The LED flashes in the following situations: • The connection between the PROFINET IO controller and the IE/AS-i LINK has broken down or the PROFINET IO controller is not active. • IE/AS-i LINK was not or was incorrectly assigned parameters by the PROFINET IO controller.
ON (green)		The LED is lit when the IE/AS-i LINK is supplied with power.

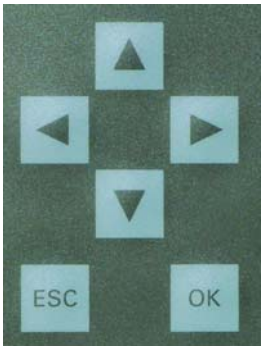
Meaning of the AS-i Line LEDs

LED (color)	Status	Meaning
SF (red)	System fault (line)	The LED is lit when a diagnostic interrupt (entering state) was triggered by the PROFINET IO controller in protected mode.
APF (red)	AS-i Power Fail	This indicates that the voltage supplied to the AS-i cable by the AS-i power supply unit is too low or is faulty.
CER (yellow)	Configuration Error	This LED indicates whether the slave configuration detected on the AS-i cable matches the expected configuration on the DP/AS-INTERFACE LINK Advanced. If they do not match, the “CER” LED is lit. The “CER” LED is lit in the following situations: • A configured AS-i slave does not exist on the AS-i cable (for example failure of the slave). • An AS-i slave exists on the AS-i cable but it was not previously configured. • An attached AS-i slave has different configuration data (I/O configuration, ID code) from the slave configured on the IE/AS-i LINK. • The IE/AS-i LINK is in the offline mode.
AUP (green)	Autoprog available	In the protected mode of the IE/AS-i LINK module, the LED indicates that automatic address programming of an AS-i slave is possible. The automatic address programming makes it much easier to exchange a defective AS-i slave on the AS-i cable (for more detailed information refer to Section 10.1).
CM (yellow)	Configuration Mode	This LED displays the mode of the IE/AS-i LINK. • Indicator on: configuration mode • Indicator off: protected mode The configuration mode is only required for installing and starting up the IE/AS-i LINK module. In the configuration mode, the IE/AS-i LINK activates all connected AS-i slaves and exchanges data with them. For more information about the configuration mode, refer to Section 4.1.
ON (green)		The LED lights up when the AS-i line is operated “Online” (the AS-i master sends AS-i frames). In the following situations, the LED goes off: • when the AS-i line is operated “Offline” (the AS-i master does not send AS-i frames). • when no I/O modules were configured for the line in HW Config

Keypad

The mode can be changed using the control buttons. You configure the underlying AS-i line interactively with the display using the control buttons.

The following buttons are located on the front panel of the IE/AS-i LINK:



Display

The graphic display has a resolution of 128 x 64 pixels.

You configure the underlying AS-i line using the keypad and the display. This allows on-site commissioning and diagnostics.

The following display appears after turning on the device and if there has been no input over the keypad for a longer period of time (see Section 4.4).

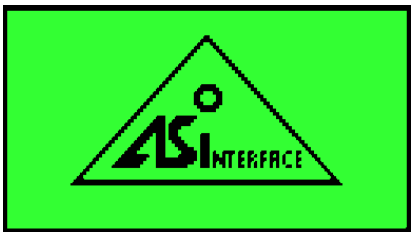


Figure 1-5 Display – Logo

Note

If a fault occurs during operation, the resulting error message will be displayed even if the Logo was previously displayed.

As soon as any entry is made using the keypad, the main menu appears allowing you to navigate through the menu structure.

Figure 1-6 Display – Main Menu

If you have selected an entry in the list (displayed inversely), a tooltip will appear after a brief time with further information on the entry (does not occur in the main menu).

1.10 Settings when Using a Firewall

Please note the following when using firewalls:

Note

When using a firewall access to the following ports must be permitted depending on the service being used:

- http Port 80/TCP (for WBM)
- TFTP Port 69
- SNMP Port 161/UDP
- SNTP Port 123 (can be changed)
- SMTP Port 25
- Trap Port 162/UDP

❑

2 Procedure – Configuration

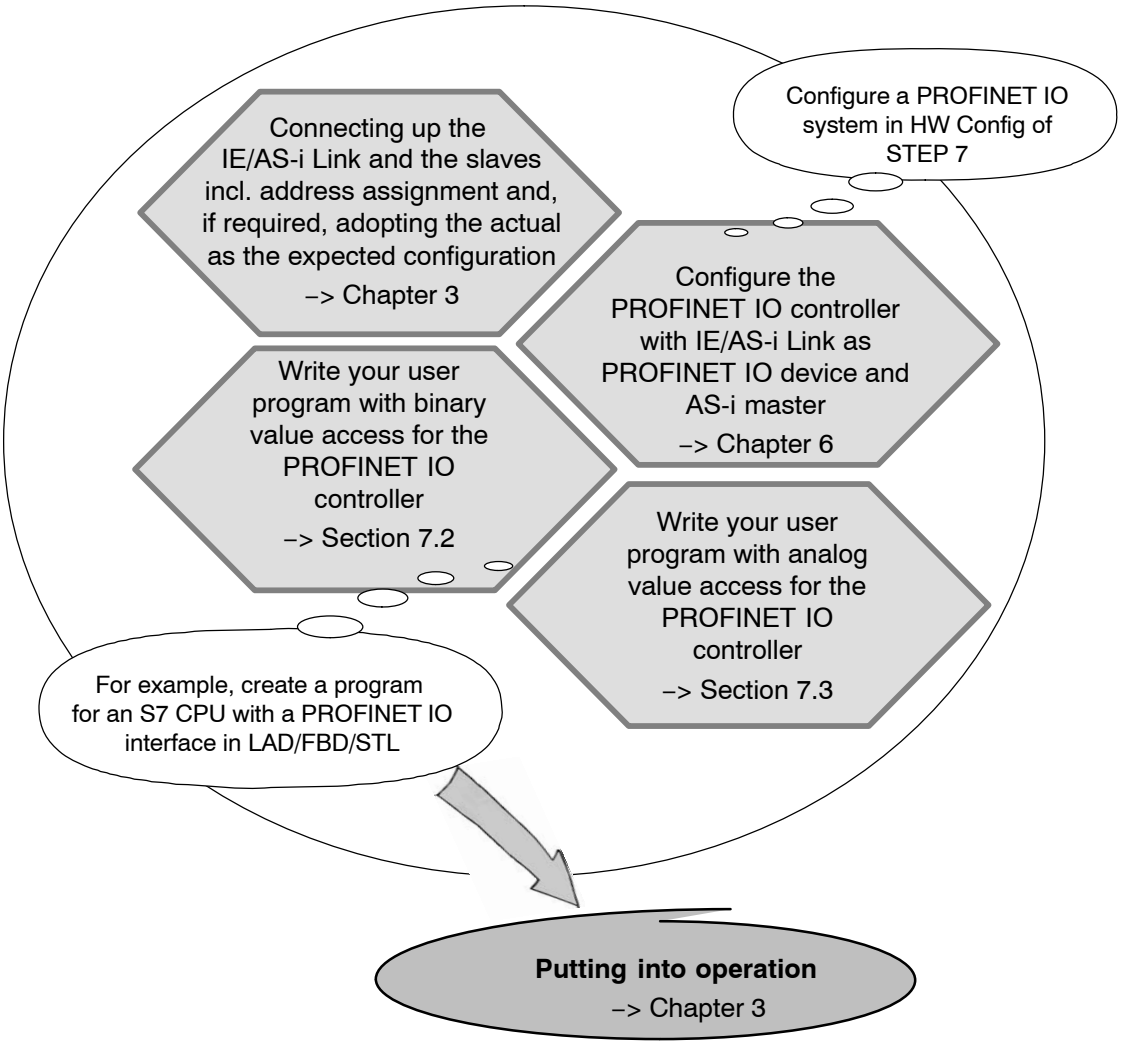
This chapter...

This chapter provides you with an overview of the steps and procedures involved in configuring the IE/AS-i LINK. You will learn the basic steps leading to commissioning and the configuration options made available to you by the IE/AS-i LINK.

2.1 What to do – an Overview

Preparations up to Commissioning

Before putting the system into operation, the following independent steps must first be worked through:



2.2 Configuration Options

There are four basic configuration options that are described in later chapters.

Configuration of the AS-Interface

- Keypad/display (see Chapter 4)

  Local configuration, commissioning and diagnostics of the AS-Interface

- Web Based Management (WBM) (see Chapter 5)

  Configuration, commissioning and diagnostics of the AS-Interface over a LAN attachment using a PG/PC with an Internet Browser

  You can change the configuration of the IE/AS-i LINK, check settings and access diagnostic data (error list and statistics) over one of the two LAN interfaces and WBM. WBM provides more extensive functions compared with the keypad and display.

Configuration of the entire system

- STEP 7 / HW Config (see Chapter 6)

  Basic total configuration of the system and programming and diagnostics using STEP 7

  If required, additional configuration of the AS-Interface in STEP 7 (default: no particular AS-i presettings)

Variable configuration of the AS-INTERFACE

- Data record interface (see Chapter 8)

  Variable configuration of the AS-Interface by the user program if AS-i configurations change

  You can also read out error counters and diagnostic data.

❑

3 Getting Started – Commissioning with STEP 7

This chapter...

This chapter provides you with the information you will require to commission an IE/AS-i LINK simply and quickly using STEP 7, the keypad and display.

It will familiarize you with the commissioning and basic functions of the master module IE/AS-i LINK.

3.1 Commissioning the IE/AS-INTERFACE LINK PN IO

You want to put an IE/AS-i LINK into operation quickly and with a minimum of effort. The following example illustrates just one of many options. It guides you through the individual steps up to the commissioning of a IE/AS-i LINK (single master).

The example is divided into the two following steps:

- Working with the IE/AS-i LINK (no other aids necessary)
- Configuring and programming with the SIMATIC Manager (PG/PC with STEP 7 necessary)

3.1.1 Requirements

- The IE/AS-i LINK is installed and connected to the AS-i cable.
- The AS-i power supply unit is connected to the AS-i cable and turned on (see Section 1.7).
- The AS-i slaves are not yet connected.
- The slaves to be connected have default address “0” (as supplied).
- Your PG/PC (with STEP 7) is connected to the LAN over the Ethernet port.
- You are using STEP 7, V5.4 or higher.
- The SIMATIC controller stations can be reached on the LAN.

3.1.2 Procedure

Working on the IE/AS-i LINK

1. Connect the AS-i slaves one-by-one to the AS-i cable and assign the required slave address.

   SYSTEM ▼ AS-i line OK Lifelist ▼ Change Address OK Change slave address OK

2. Adopt the actual configuration as the desired configuration on the IE/AS-i LINK.

   SYSTEM ▼ AS-i line OK Lifelist ▼ Act –> Conf OK Adopt Act –> Conf OK

   Result: All the LEDs for the AS-i line on the IE/AS-i LINK are off or green; in other words, all slaves have been included successfully.

3. Connect one of the two LAN interfaces of the IE/AS-i LINK to the PROFINET IO controller (for example programmable controller) over an Ethernet cable.

Configuring and programming with the SIMATIC Manager

1. Create a STEP 7 project on your PG/PC in the SIMATIC Manager and include an S7 station with PROFINET IO controller.
2. Open the hardware configuration “HW Config” of this station and insert a PROFINET IO system.

Note

If you are using a version of STEP 7 lower than V5.4 SP3, you will first need to import the GSDML file of the IE/AS-i LINK. Installation is described in Section 6.3.1.

---

3. In the catalog of HW Config, go to **PROFINET IO** > **Gateway** > **IE/AS-i Link PN IO** > **6GK1 411–2ABx0** (2AB10 single or 2AB20 double master) and select the IE/AS-i LINK with the required firmware version and drag it to the PROFINET IO system.

   If you are using STEP 7 V5.4 or V5.4 SP1, select the link from the “GSD” folder.

   Result: The IE/AS-i LINK with a full configuration is placed in the PROFINET IO system (a AS-i placeholder module is inserted in the link for all possible AS-i slaves). In the configuration table of the station window, the modules are mapped to the slots of the IE/AS-i LINK.

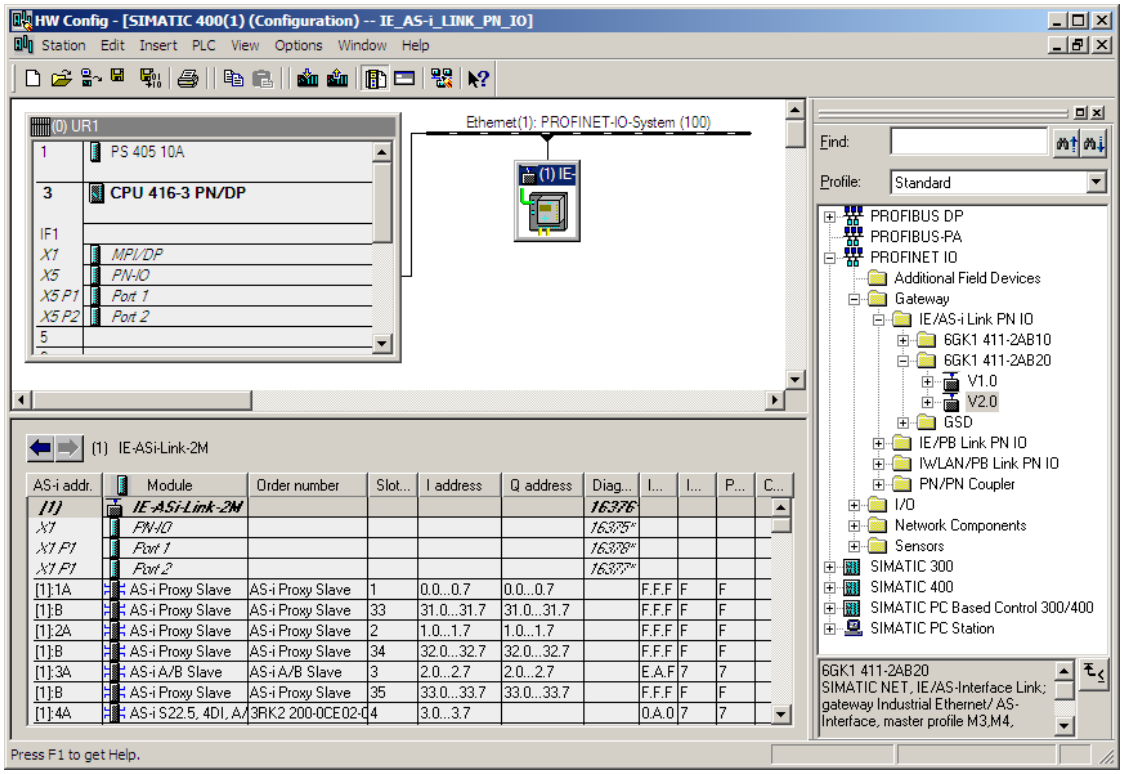


Figure 3-1 Open Configuration of the PROFINET IO Controller in HW Config (STEP 7 as of V5.4 SP3)

4. Optional:
   Open the Properties dialog of the IE/AS-i LINK by double-clicking on the link in the upper part of the station window if you want to change the PROFINET device name or the IP parameters of the IE/AS-i LINK. (PROFINET device name and IP parameters are entered automatically by STEP 7)
5. Select the menu command Station > Save and Compile.
6. In the upper detailed window, select the IE/AS-i LINK and Select the menu command PLC > Ethernet > Assign device name... and assign the PROFINET device name in the dialog that opens. This establishes a connection to the attached IE/AS-i LINK and downloads the PROFINET device name to the module.
7. Select the menu command PLC > Download to Module.... This downloads the configuration to the connected module.

   The link module is now in “protected mode” (see Section 4.1).
8. Create your user program from which you can access the I/O addresses set above.

   If, for example, you want to access the input data of AS-i slave 2A of AS-i line [1], read input byte 1 (see Figure 3-1 and Section 7).
9. Download the program to the S7 station with the PROFINET IO controller.

Result

You have configured the IE/AS-i LINK, created the corresponding STEP 7 configuration and a user program with which you can access the I/O addresses of the AS-i slaves from the programmable controller.

❑

4 Keypad and Display

This chapter...

This chapter explains how the menus of the IE/AS-i LINK display are structured and how to work with the keypad.

Note

For a detailed description of all parameters and settings, refer to Chapter 5. There you will also find more detailed information on individual functions, for example the requirements for editing.

Warning

You can change the configuration of the IE/AS-i LINK during operation when there is a connection to the PROFINET IO controller or write process data of the real process.

The change in the configuration or to process data can trigger unexpected reactions in the process that can lead to death, serious injury or damaged property.

Consider the consequences before you act. Take the following precautions:

- Restrict the ways of accessing the IE/AS-i LINK.
- Assign a secure password for access to Web Based Management.
- Install a physical emergency stop circuit for the machines or the process.

4.1 Configuration and Modes

Meaning of Configuration with the Keypad and Display

This type of configuration allows you to commission the AS-Interface on the IE/AS-i LINK quickly and with little effort.

If you want to configure the AS-Interface using STEP 7 or the GSDML file (see Chapter 6), you can skip this chapter.

Modes

The IE/AS-i LINK has two modes:

- Configuration mode
- Protected mode

Configuration Mode

The configuration mode is used during AS-i installation and startup.

You can change the link module from protected mode (productive operation) to configuration mode in the following ways:

- Keypad and display:
  Description in Section 4.3
- Web Based Management:
  “AS-i Line” > “Configuration” > “Status” tab > Clear the “Protected mode” check box
- Data record interface:
  Data record 17 Set_Operation_Mode

In the configuration mode, the IE/AS-i LINK can exchange data with every AS-i slave connected to the AS-i cable (except for the AS-i slave with address ‘0’). Any AS-i slaves that are added later are detected immediately by the master, activated and included in the cyclic data exchange.

On completion of commissioning (after the “Download to module” step), the IE/AS-i LINK is in “protected mode” and AS-i slaves that are active at this point are configured. The AS-i slave information shown below is stored in non-volatile memory on the IE/AS-i LINK:

- The addresses
- The ID codes
- The I/O configuration

Protected Mode

If the IE/AS-i LINK is in protected mode, it only exchanges data with slaves that are “configured”. In this sense, “configured” means that the slave addresses stored on the IE/AS-i LINK and the configuration data match the values of the existing AS-i slaves.

You enable protected mode by downloading the configuration from the PG to the Link module (HW Config > Download to Module...) or with the three options mentioned in the previous section “Configuration Mode”.

4.2 Buttons and Working in the Menus

Buttons

You make your entries using cursor buttons and the “ESC” and “OK” buttons (illustrated in Section 1.9). The buttons have the following functions:

- “right”/“left” cursor buttons  , :
  Navigation within the menu structure and menu lists
- “up”/“down”  ,  :
  – Navigation in the menu structure and menu lists
  – Changing alphanumeric characters
- “ESC” button  :
  Exits the current menu (you move up one level in the menu structure)
- “OK” button  :
  – Opens a follow-on menu or
  – Saves your input

In the description of the menu paths in Section 4.4 and 5, the “ > ” character stands for pressing the “OK” button and, where necessary, navigating to the required menu entry.

Meaning in the Menus

- Changing characters

  You can change the value of alphanumeric characters with the “up”/“down” buttons. Possible values are: a...z, A...Z, 0...9, –, .

  Using the “right”/“left” cursor keys within a character string, you move to a different character.

- Saving entries

  If you change values by entering alphanumeric characters, you can save them by pressing the “OK” button. You then exit the menu and move up one layer in the menu structure.

- Saving options

  If, on the other hand, you change an option (check box) with the “OK” button, so that a check mark appears or is cleared, the value is already saved and you can exit the menu with the “ESC” button.

  Example:

  AS-i line 1 > Line status > Protected >
  Autoprog. >
  Offline >

- Navigation in lists (AS-i Line: Lifelist, Error List, Slave Info)

  You can navigate through the lists from one slave to the next with the “up”/“down” cursor buttons.

  You can navigate from one list to the next with the “right”/“left” cursor buttons.

Display

If you make no further entries, the display changes to the “AS-i” logo following a timeout. You can set the timeout time for the display with the following menu path:

SYSTEM > Configuration > Timeouts > Display >

4.3 Working Examples

4.3.1 Example: Changing the status “Protected mode” <–> “Configuration mode”

Menu structure:

AS-i Line 1 > Line status >
Protected >
Changing between “Protected mode” / “Configuration mode”

Procedure

Initial status: The “AS-i” logo is displayed.

1. Press any button.
   Result: The main menu is displayed, “SYSTEM” is selected.
2. Press three times  :
   The “AS-i Line 1” entry is selected.
   (Entry for a single master: “AS-i Line”)
3. Press  :
   The “Lifelist” entry is selected.
4. Press three times  :
   The “Line status” entry is selected.
5. Press  :
   The “Protected” entry is selected.
   The check box on the right of the row can have the following statuses:
   - Check box selected (with check mark):
     The module is in protected mode.
   - Check box not selected (empty):
     The module is in configuration mode.
6. Press  :
   The module changes to the other mode.

   As soon as you set or clear a check mark, the change is saved.
7. Press  :
   You return to the menu structure to the “Line status” entry.

4.3.2 Example: Changing the PROFINET device name

Menu structure:

SYSTEM > Configuration > General > PNIO device name > change...

Procedure

Initial status: The “AS-i” logo is displayed.

1. Press any button.
   Result: The main menu is displayed, “SYSTEM” is selected.
2. Press three times OK:
   The entries “Configuration” and “General” are displayed.
   The third time you press the “OK” button, a list appears with the first entry “PNIO device name” entry. The PROFINET device name is displayed in the second row of the list.
3. Press once more OK:
   The cursor is located in the editing box of the device name.
4. Navigate with the cursor buttons  and  to the position you require.
5. Select the required position with the cursor buttons  and  and enter the required letter or the number (a...z, A...Z, 0...9, –, .).
6. Repeat step 4. – 5. for each character you want to change.
7. Confirm your entries with OK.
   You return to the list with the first “PNIO device name” entry.
8. Use the cursor buttons to navigate to any menu entry.

4.4 Menu Structure

The menu structure is similar to the WBM configuration (see Chapter 5) but is more compact due to the display limitations.

If the content of the selected menu is larger than the display, an arrow appears at the top or bottom.

Note

For more detailed information on individual menu items relating to the function or configuration, refer to Chapter 5.

“SYSTEM” menu

SYSTEM > Configuration > General > PNIO device name > Change... >
Hardware
Firmware
Boot software
Order number
Serial number
MAC address

SYSTEM > Configuration > I&M > Manufacturer ID
Order ID
Serial number
HW revision
SW revision
Revision counter
Profile ID
Profile type
Version
Supported array
Function tag > enter... >
Location tag > enter... >

SYSTEM > Configuration > Timeouts > Display > enter time... >
Backlighting > enter time... >

SYSTEM > Configuration > Language > select... >

SYSTEM > Reset > Restart > Run a restart
> Clear/reset module > Clear/reset module >
> Reset to factory settings > Set the factory defaults >

SYSTEM > Errors > Error display

SYSTEM > C-PLUG > Info (display of the C-PLUG status)
> Internal Memory –> C-PLUG > move... >
> C-PLUG –> Internal Memory > move... >

SYSTEM > Diagnostic Buffer (Display) > Delete Diagnostic Buffer? >

“IND. ETHERNET” menu

IND. ETHERNET > Info > Ethernet Port 1 >
- Link (physical connection up/down)
- Mode (10/100 Mbps, half duplex/full duplex)
- Input bytes (number of received bytes)
- Output bytes (number of sent bytes)

> Ethernet Port 2 ... (as for Port 1)

IND. ETHERNET > IP Parameters > DHCP >
- disabled
- MAC address
- Device Name
- Client ID

- Change Client ID

IP > Set IP address
Mask > Set subnet mask
GW > Set gateway

IND. ETHERNET > MAC address > display MAC address

“PROFINET IO” menu

PROFINET > Info > Device name > Change PROFINET device name
- IP address Controller
- Controller name (PROFINET device name of controller)
- Connection (AR status online/offline)
- Controller (Controller status RUN/STOP)
- Update time [ms]

PROFINET > Error

“AS-i Line” menu

AS-i Line 1 > Lifelist > Display... (select slave and “OK”)

Config.	>	Change configuration
Parameter	>	Change parameters
Bin. I/O	>	Change binary Inputs/outputs
Analog	>	Change analog inputs/outputs
Status		
Statistics	>	Reset all counters
Statistics	>	Reset all counters
String transfer	>	Write (string transfer to slave)

AS-i Line 1 > Error List > Display... (select slave and “OK”)

Statistics > Reset error counters
- Slave failure
- Missing frames
- Bad frame

Statistics > Reset error counters
- I/O Error
- protocol error
- Bad master frame

AS-i Line 1 > Statistics > Line statistics
- AS-i power failures
- Short to ground

- Slave failure
- Missing frame
- Bad frame
- Peripheral error
- Protocol error
- Bad master frame

Reset counters > Reset all counters

AS-i line 1 > Line status >
- Protected > enable / disable
- Autoprog. > enable / disable
- Offline > “Online” / “Offline”

- System error (image of the “SF” LED (line))
- Configuration error (image of the “CER” LED)
- AS-i powerfail (image of the “APF” LED)
- Short to ground

AS-i Line 1 > Slave Info >

Config.	>	Change configuration
Parameter	>	Change parameters
Bin. I/O	>	Change binary Inputs/outputs
Analog	>	Change analog inputs/outputs
Status		
Statistics	>	Reset all counters
Slave Failure		
Missing frames		
Bad frame		
Statistics	>	Reset all counters
I/O Error		
Protocol Error		
Bad master frame		
String transfer	>	Write (string transfer to slave)

AS-i Line 1 > Change addr. > Change slave address

AS-i Line 1 > Change ID1 > Set ID1 (only for slave “0”)

AS-i Line 1 > Act –> Conf > Adopt Act –> Conf

AS-i Line 1 > Address help > enable/disable

SYSTEM > AS-i Line 2 ...: Structure and use as with AS-i Line 1

With a single master, only “AS-i line” is displayed.

❑

5 Display / WBM Configuration

This chapter...

In this chapter, you will see how to configure the IE/AS-i LINK using one of the two options shown below:

- Keypad and Display

  or

- Web Based Management (WBM)

The individual functions are introduced with both optional representations.

Note

At the start of the description of the individual pages, you will find the corresponding command sequences for keypad and display. The command sequences are indicated by rhe symbol shown on the left.

For some functions in the pages of Web Based Management (WBM), there is no corresponding function when configuring with the display.

Warning

You can change the configuration of the IE/AS-i LINK during operation when there is a connection to the PROFINET IO controller or write process data of the real process.

The change in the configuration or to process data can trigger unexpected reactions in the process that can lead to death, serious injury or damaged property.

Consider the consequences before you act. Take the following precautions:

- Restrict the ways of accessing the IE/AS-i LINK.
- Assign a secure password for access to Web Based Management.
- Install a physical emergency stop circuit for the machines or the process.

5.1 Web Based Management (WBM) with the IE/AS-i LINK

5.1.1 WBM – Requirements and Starting Up

Principle

With WBM, the IE/AS-i LINK provides you with various functions that you can use in conjunction with an Internet Browser (for example, Microsoft Internet Explorer, Version 6.0 or higher).

You work with a Java script that is stored on the IE/AS-i LINK and loaded by the browser.

To access the IE/AS-i LINK, you enter the IP address of the device in the address box of the browser.

Requirements for using Web Based Management

An IP address with a suitable subnet mask must be set on the IE/AS-i LINK (for example, using keypad and display). Remember that there is a setting in STEP 7/HW Config in the Properties dialog of the IE/AS-i LINK with which the IP address can be assigned by the PROFINET IO controller. In this case, the IP address of the device is overwritten when the PROFINET IO controller starts up.

To be able to access the IE/AS-i LINK using WBM, you require a PC with an Internet Browser. We recommend that you use the Microsoft Internet Explorer, Version 6.0 or higher. As an alternative, other browsers can also be used.

The browser must be capable of JavaScript. The script can only execute if JavaScript is enabled in the browser.

The PC must be connected to the LAN to which the IE/AS-i LINK is attached and the Internet browser must be started.

Note

With some language settings in Windows, the page refresh with the Internet Explorer does not work correctly in some situations. In this case, the browser must be set so that the newer version of the page is loaded from the server each time it is accessed. In the Internet Explorer, you can activate this option in the “Tools” > “Internet Options” menu > “General” tab by clicking the “Settings” button in the “Temporary Internet Files” group box.

Note

The screenshots shown in this chapter were created with the Microsoft Internet Explorer Version 6.0. If you use other browsers, the WBM pages may appear differently.

Note

If you use a proxy server in the Internet Explorer and the option “Bypass proxy server for local addresses” in “Tools” > “Internet Options” > “LAN Settings” is selected, errors may occur the first time you load the WBM. In this case, click “Update”.

Note

When using a **firewall**, port “http Port 80/TCP” must be open to allow use of WBM.

Depending on the other services being used, access to other ports must also be possible. You will find an overview in Section 1.10.

Starting WBM

To start WBM, enter the following in your Internet browser:

`http://<IP address of the IE/AS-i LINK>`

WBM starts with the “System Configuration” page. You can now read the pages.

To be able to make changes, you must log in.

Logging In

Make the following entries in the Start window:

- Name: “admin”
- Password: “admin”

Confirm your entries by clicking the “Login” button.

The default for both name and password is “admin”. The name cannot be modified.

Notice

You should therefore change the password (Section 5.2.4). The module clear/reset function or resetting to factory defaults also resets the password.

Note

If you do not log in, you will not be able to make changes.

If no input is made for more than 10 minutes (default), you will be logged out automatically. You can change the time before logout in “System > Configuration > Settings”.

5.1.2 Working with WBM

Buttons

- “Refresh”
  If you click on this button, current data of the IE/AS-i LINK is requested and displayed.
- ”Apply”
  If you click on this button, configuration data that has been entered is stored on the IE/AS-i LINK or downloaded to the connected slaves.
- 
  Printing the current view. You can make the print settings with the menu commands “File” > “Print”, “File” > “Page Setup” or in “Tools” > “Internet Options” > “Advanced” > “Print”.
- ”Language” list box
  Select the required language for the display. The following languages are available:
  - English
  - German
  - French
  - Spanish
  - Italian

  When you start WBM, the program checks the language setting of the computer and opens the start page with the language set on the computer assuming this language is available in WBM.

Note

Changing configuration data on the IE/AS-i LINK is only possible if you are logged in with the “admin” login.

The “apply” button is active only if changes were made.

To move between the WBM pages, use the navigation on the left of the WBM pages and the tabs at the top of the pages. Where possible, avoid using the browser “backwards” and “forwards” buttons.

5.2 Configuration and Diagnostics

5.2.1 Navigation “System –> System Configuration”

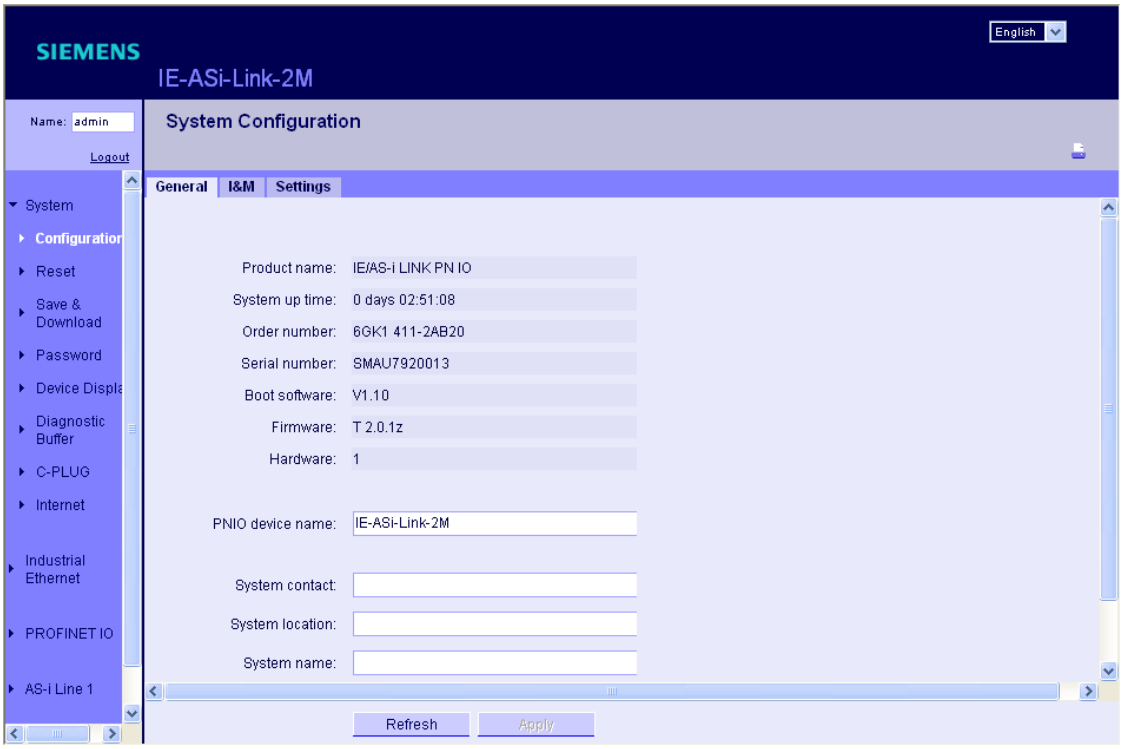
5.2.1.1 General

Keypad/Display

SYSTEM > Configuration > General > PNIO device name > Change... >
Hardware
Firmware
Boot software
Order number
Serial number
MAC address

WBM: “General” tab

This tab displays the general device data and you can set various system values.



Parameter	Function
Product name	Displays the product name (here: IE/AS-i LINK PN IO).
System up time	The operating hours counter shows how long the device has been in operation since the last cold restart (power OFF > ON cycle) on the IE/AS-i LINK.
Order Number	Displays the order number (MLFB) of the device.
Serial number	Displays the serial number of the device.
Boot software	Here, you can see the version of the boot software. The boot software is used to load new firmware.
Firmware	Displays the firmware version of the device.
Hardware	Displays the hardware version of the device.
PNIO device name	Enter the PROFINET device name in this box. The device registers itself with this name, for example during establishment of the PROFINET IO connection by the PROFINET IO controller.
System contact	In this box, you enter the name of a contact person responsible for management of the device (SNMP value “sysContact”).
System location	Enter a location for device in this box, for example, a room number (SNMP value “sysLocation”).
System name	Enter a name for the device in this box (SNMP value “sysName”).

5.2.1.2 Identification & Maintenance

Here, you can see various details of the IE/AS-i LINK for information and for maintenance purposes.

You can also assign a plant-specific function tag and location tag for the IE/AS-i LINK.

Keypad/Display

SYSTEM > Configuration > I&M > Manufacturer ID
Order ID
Serial number
HW revision
SW revision
Revision counter
Profile ID
Profile type
Version
Supported array
Function tag > enter... >
Location tag > enter... >

WBM: “I&M” tab (Identification & Maintenance)

Parameter	Meaning
Function tag	Function identifier
Location tag	Location identifier

5.2.1.3 Settings

Here, you can set various times and the language.

Keypad/Display

SYSTEM > Configuration > Timeouts > Display > enter time... >
Backlighting > enter time... >

SYSTEM > Configuration > Language > select... >

WBM: “Settings” Tab

Parameter	Function
Automatic logout	If no operator input is made for the time set here, the operator is automatically logged out.
Go to Start page	If no operator input is made for the time set here, the device display switches to the Start (logo) display.
Turn off backlighting	If no operator input is made for the time set here, the backlighting of the device display is turned off.
Language	Select the language for the device display here.

5.2.2 Navigation “System –> Reset”

Here, you can restart or reset the IE/AS-i LINK or reset it to the factory settings.

Keypad/Display

SYSTEM > Reset > Restart > Run a restart
> Clear/reset module > Clear/reset module >
> Reset to factory settings > Set the factory defaults >

If you select the “Clear/reset module” and “Reset to factory settings” functions with “OK”, you will be prompted to confirm that you want to execute the function. To execute the function, press “OK”, otherwise press “ESC”.

Caution: There is no prompt for confirmation in the “Restart” submenu.

WBM: “Reset” tab

Parameter	Function
Warm restart	Click this button to restart the IE/AS-i LINK. During a warm restart, the PROFINET IO connection is terminated and established again and there is an offline-online change on the AS-i line. This takes about 10 seconds.
Clear/reset module	Click this button to reset the module to the factory configuration settings. You will be asked to confirm “Clear/Reset module” in a separate dialog. The module remains accessible because the following protected defaults are not reset when the module is reset: • IP address • Subnet mask • Default gateway (IP address of the default router) • DHCP flag • PROFINET device name • System name • System location • System contact
Reset to Factory Settings	Click this button to restore the factory configuration settings. You will be asked to confirm “Reset to factory settings” in a separate dialog box. The protected settings are also reset. **Note** You will need to set the IP parameters of the IE/AS-i LINK again before you can access the device again (see Section 4.4: IND. ETHERNET > Info).

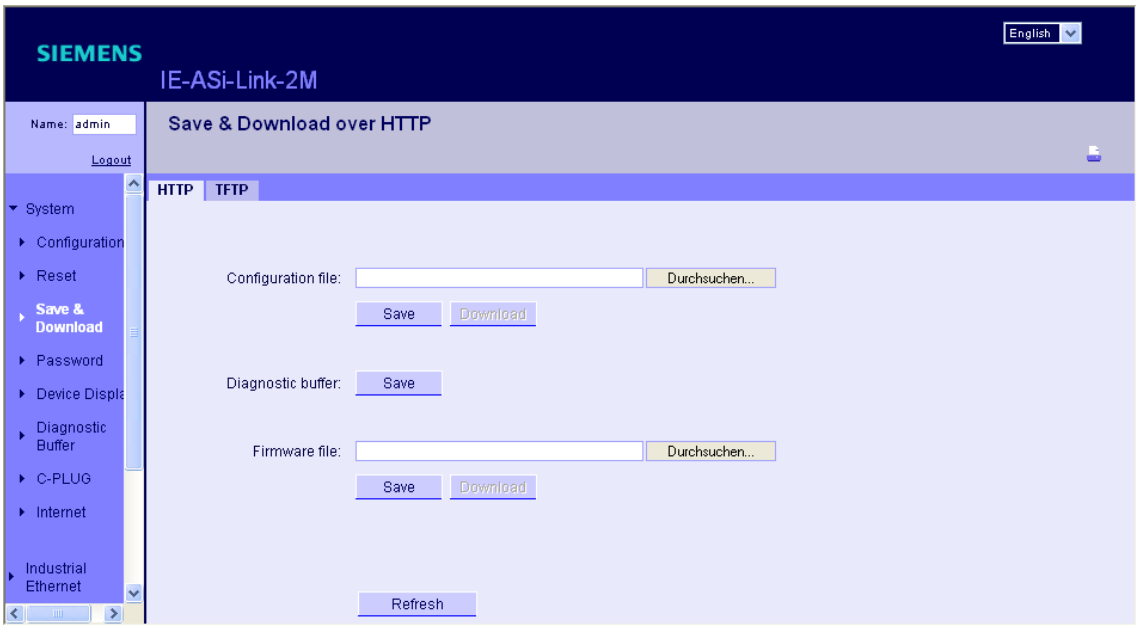
5.2.3 Navigation “System –> Save & Download”

WBM provides the option of saving configuration information in a file on your computer or TFTP server and to download such data from a file from the computer or TFTP server to the IE/AS-i LINK.

You can also download new firmware from a file from your computer or a TFTP server.

5.2.3.1 HTTP (Hypertext Transfer Protocol)

WBM: “HTTP” tab



Parameter	Function
Configuration file	Here, you enter the name and, if necessary, the directory path of the configuration file that you want to download to the IE/AS-i LINK in which you want to save the current configuration information. As an alternative, you can select the file with the “Browse” button.
Diagnostic buffer	With “Save”, you can save the diagnostic buffer on the local computer/network.

Parameter	Function
Firmware file	Here, you enter the name and, if necessary, the directory path of the firmware file that you want to download to the IE/AS-i LINK or in which you want to save the firmware file. As an alternative, you can select the file with the “Browse” button. **Note** A firmware update is possible at any time over the LAN interface (Ethernet). The project engineering data and configuration data on the C-PLUG or in the internal memory remains unchanged and can continue to be used.
Save	Save relevant file on the computer/network.
Download	Downloads the file to the IE/AS-i LINK. After downloading a firmware file to the IE/AS-i LINK, the module is automatically restarted

5.2.3.2 TFTP (Trivial File Transfer Protocol)

To use this service, port 69 of the relevant server must be opened.

WBM: “TFTP” tab

Parameter	Function
TFTP server IP address	IP address of the TFTP server with which you want to exchange data.
TFTP server IP port	Port of the TFTP server over which data exchange is handled.
Configuration file	Name (maximum 255 characters) and, if necessary, the directory path of the configuration file that you want to download to the IE/AS-i LINK or in which you want to save the current configuration information.
Diagnostic buffer	With “Save”, you can save the diagnostic buffer on the TFTP server.
Firmware file	Name (maximum 255 characters) and, if necessary, the directory path of the firmware file that you want to download to the IE/AS-i LINK or in which you want to save the current firmware. As an alternative, you can select the file with the “Browse” button.
Save	Saves the file.
Download	Downloads the file to the IE/AS-i LINK.

5.2.4 Navigation “System –> Password”

WBM: “Password” tab

On this page, you can change the password.

Possible length: 1 to 30 characters

Note

Default password when supplied: admin

Parameter	Function
Current password	Current password
New password	New password
Confirm password	Repeat the new password

Note

If you have forgotten your password, you can reset to the factory settings in the display of the IE/AS-i LINK by clearing/resetting or resetting and then access WBM again with the default password.

5.2.5 Navigation “System –> Device Display”

LED Simulation

The IE/AS-i LINK has several LEDs that provide information on the status of the device and connected slaves. Depending on their location, direct access to the device is not always possible. To help in this situation, WBM provides a simulated display of the LEDs.

The “Device Display” shows the LEDs of the IE/AS-i LINK with the same colors as on the device. The status as shown here is the status when the WBM page is opened. To display new changes, click on “Refresh” or “Refresh Cyclically”. The meaning of the LEDs is explained in Section 1.9.

If all the slaves were deleted in the configuration of an AS-i line, all the LEDs of this line are off. Regardless of whether or not an AS-i line is connected to the link module, the “APF” LED is also off in this situation.

WBM: “Device Display” tab

5.2.6 Navigation “System –> Diagnostic >Buffer”

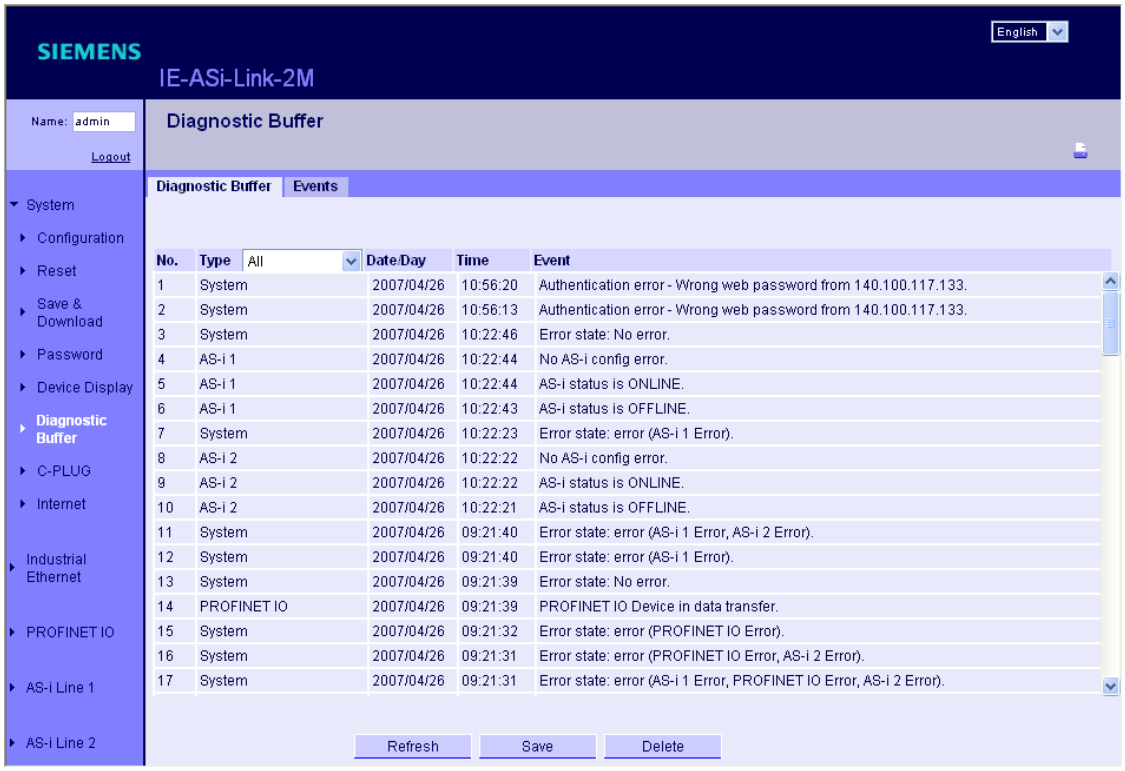
5.2.6.1 Diagnostic Buffer

Keypad/Display

SYSTEM > Diagnostic Buffer (Display) > Delete Diagnostic Buffer? >

After calling the “Delete diagnostic buffer?” function with “OK”, you are prompted to confirm this action with “OK”.

WBM: “Diagnostic Buffer” Tab



In this table, all events are listed in the chronological order in which they arrive. (The latest entry is at the start of the table and the oldest at the end.) The buttons have the following functions:

- Refresh: Refreshes the diagnostic buffer
  The latest entry is at the highest position.
- Delete: Delete the diagnostic buffer
- Save: Saves the diagnostic buffer in a file

Parameter	Function
No.	Consecutive number of the entry
Type	Origin/source of the entry
Date/Day	Date of the entry if synchronized, otherwise the time since the last restart is displayed.
Time	Time of the entry **Note** If the IE/AS-i LINK is synchronized with a time server, the current time is displayed. Otherwise the time since the last startup is displayed.
Event	Display of the diagnostic buffer entry

5.2.6.2 Events

WBM: “Events” Tab

In this tab, enable or disable the following message in the listed events:

- Message by E-mail
- Message by SNMP trap
- Entry in the diagnostic buffer

The “E-mail” and “SNMP trap” options can only be activated here if the appropriate entries (addresses etc.) were made previously in the “Ethernet” menu, “E-mail” or “SNMP” tabs. See Section 5.2.9.2.

5.2.7 Navigation “System –> C-PLUG”

Here, you will find information as to whether a C-PLUG exists and whether it is valid for the device. If a valid C-PLUG is inserted, the menu provides information on the configuration data stored on the C-PLUG. You can move the configuration from the internal memory to the C-PLUG and vice versa.

Keypad/Display

SYSTEM > C-PLUG > Info (display of the C-PLUG status)
> Internal Memory –> C-PLUG > move... >
> C-PLUG –> Internal Memory > move... >

After calling the “Move Configuration” and “Delete Diagnostic Buffer?” functions with “OK”, you are prompted to confirm these actions with “OK”.

WBM: “C-PLUG” tab

Parameter	Function
C-PLUG status	The status of the C-PLUG is displayed here. The following statuses are possible: • ACCEPTED There is a C-PLUG with a valid and suitable content inserted in the device. • C-PLUG has wrong device group Invalid or incompatible content of the inserted C-PLUG. This status is also shown if a C-PLUG of another device type was inserted. • CRC ERROR A C-PLUG with bad content is inserted. • NOT FOUND There is no C-PLUG inserted in the device.
C-PLUG device group	Specifies the device group of the SIMATIC NET product line that was written to the C-PLUG.
C-PLUG device type	Specifies the device type of the SIMATIC NET product line that was written to the C-PLUG.
Configuration revision	Specifies the version and configuration structure. This information relates to the configuration options supported by the device. This does not relate to the concrete hardware configuration. This information can change when you run a firmware update.
Type	Shows the type of the C-PLUG file system.
Size	Shows the maximum storage capacity of the C-PLUG file system.
Currently in use	Shows the storage space in use in the C-PLUG file system.
C-PLUG information string	Shows information about the device of the SIMATIC NET the product line that previously used the C-PLUG, for example order number, type designation, version of hardware and software (string display box).
Move configuration	If you are logged on, you can make the following settings here: • Internal Memory –> C-PLUG The configuration in the internal memory of the device is moved to the C-PLUG. This is followed by a restart. Use case: The device starts up with a C-PLUG inserted. The C-PLUG contains a valid configuration that differs, however, from the configuration in the internal memory of the IE/AS-i LINK. With this function, you can overwrite the content of the C-PLUG with the original device configuration still stored on the IE/AS-i LINK. • C-PLUG –> Internal Memory The configuration in the C-PLUG is moved to the internal memory of the IE/AS-i LINK. Use case: You want to remove the C-PLUG from the device. Before removing the C-PLUG, move the configuration from the C-PLUG to the internal memory of the device. You will then need to restart the IE/AS-i LINK manually (power OFF/ON).
Apply	Apply the settings selected in “Move configuration”.

5.2.8 Navigation “System –> Internet”

WBM: “Internet” tab

The link brings you to an Internet page with more information on the IE/AS-i LINK.

Parameter	Function
Information on the Internet	This button/link brings you to further information on the Internet at: http://support.automation.siemens.com/WW/view/en/22504489

5.2.9 Navigation “Industrial Ethernet –> Configuration”

The display menus and the pages of the WBM allow you to set the IP parameters. Here, you can specify whether the IE/AS-i LINK obtains its IP address dynamically or whether you set a fixed address. In the pages of WBM, you can also activate options for accessing the device, such as SNMP.

Basics on Configuring the IP Parameters

If you change an IP parameter, existing Ethernet connections are terminated.

Note

When shipped, SNMP is enabled.

When shipped, no IP configuration (IP address, subnet mask and default gateway) is set.

Notice

If the IP address is assigned by a DHCP server, it is possible that the link will not be accessible for brief periods when short IP address lease times (< 5 minutes) elapse.

Notice

Remember that there is a setting in STEP 7/HW Config in the Properties dialog of the IE/AS-i LINK with which the IP address can be assigned by the PROFINET IO controller. In this case, the IP address of the device is overwritten when the PROFINET IO controller starts up.

You will find rules on specifying IP address and subnets in the STEP 7 online help under “IP address”.

5.2.9.1 IP Configuration

Keypad/Display

IND. ETHERNET > IP Parameters > DHCP >
disabled
MAC address
Device Name
Client ID

Change Client ID
IP > Set IP address
Mask > Set subnet mask
GW > Set gateway

The following options are available for configuring the IP parameters:

- DHCP: Assignment of the IP address by a DHCP server

  If “DHCP” is enabled, a check mark is set to the right in the display line. After pressing “OK”, the display jumps to the next menu to the line of the currently enabled option (disabled, MAC address, device name or client ID).

  – disabled: No assignment of the IP address by DHCP server
  – MAC address: Assignment by DHCP server, identification of the link using the MAC address
  – Device name: Assignment by DHCP server, identification of the link using PROFINET device name (if this is configured)
  – Client ID: Assignment by DHCP server, identification of the link using client ID (only if this is configured)
  – Change client ID > Enter client ID and “OK”

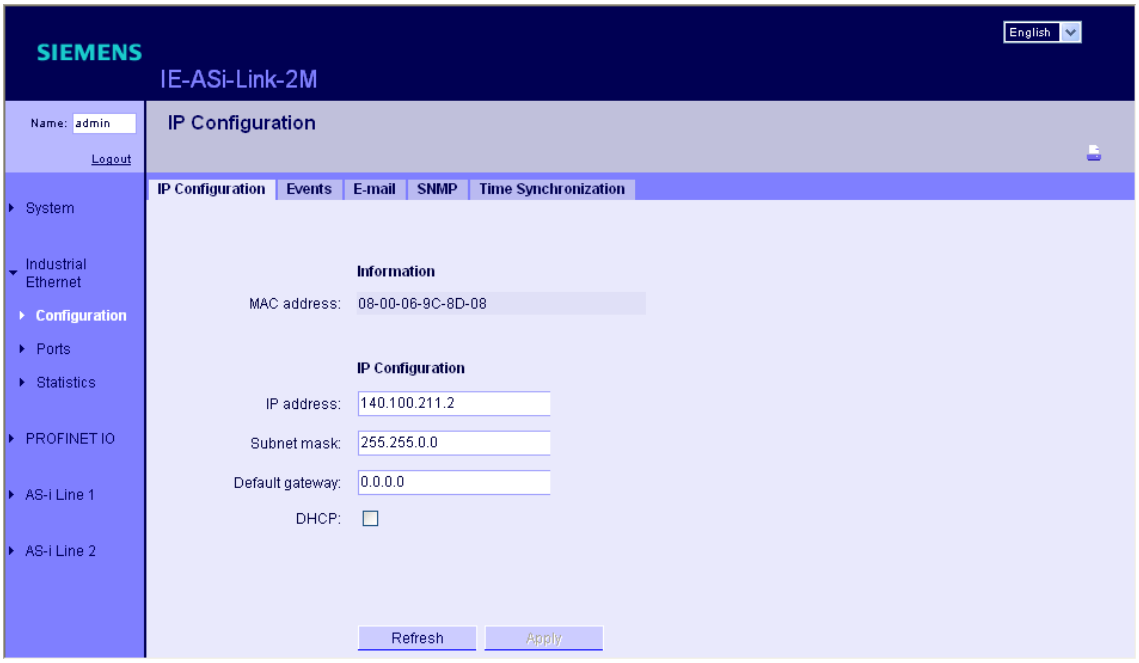
Note

If “device name” or “client ID” is set as the identification type, but no name has been assigned, the IP parameters are automatically assigned using the MAC address.

- IP: IP address set manually
- Mask: Setting of a subnet mask
- GW: Setting the gateway when a gateway is used

IND. ETHERNET > MAC address > display MAC address

WBM: “IP Configuration” Tab



Parameter	Function
MAC address	Shows the MAC address of the device.
IP address	IP address of the IE/AS-i LINK. If you make a change here, this is automatically updated in the display. If the selected address is already occupied, the connection to the IE/AS-i LINK is aborted. Enter the previous address in the Internet browser to restore the connection.
Subnet mask	Here, you enter the subnet mask of the IE/AS-i LINK.
Default Gateway	Here, you enter the address of the default gateway.
DHCP	Enables/disables the function with which the IE/AS-i LINK searches the network for a DHCP server. If a DHCP server is found, the configuration is set according to the data of the server. You can choose between the following DHCP identification types: • MAC address (default) • PNIO device name (PROFINET device name) • Client ID

5.2.9.2 Events

WBM: “Events” Tab

On this page, you specify how the IE/AS-i LINK reacts to system events and to which. By selecting the corresponding check box, you specify which events cause which reactions from the IE/AS-i LINK. The following options are available:

- The IE/AS-i LINK sends an E-mail.
- The IE/AS-i LINK triggers an SNMP trap.
- The IE/AS-i LINK saves the event in the diagnostic buffer.

Parameter	Function
E-mail:	Enables/disables the sending of an E-mail when the corresponding event occurs. To use this service, port 25 of the relevant server must be opened.
Trap	Enables/disables the triggering of an SNMP trap when the corresponding event occurs. To use this service, port 162/UDP of the relevant server must be opened.
Diagnostic buffer	Enables/disables the saving of the event in the diagnostic buffer.

The “E-mail” and “SNMP trap” options can only be enabled here if you made the appropriate entries (addresses etc.) on the “Ethernet” page, “E-mail” or “SNMP” tabs earlier (see Section 5.2.9.3 and 5.2.9.4).

Notice

Avoiding message storms

After a message has arrived (event: for example, slave failure), a new message is triggered at the earliest after 3 seconds. If changes occur quickly, intermediate statuses can therefore be lost.

5.2.9.3 E-mail

To use this service, port 25 of the relevant server must be opened.

WBM: “E-Mail” tab – monitoring the network with E-mails

The IE/AS-i LINK provides the option of sending an E-mail when an alarm occurs (for example to the maintenance technician). The E-mail contains the identification of the sending device, a description of the cause of the alarm in plain language and a time stamp with the system time. This allows simple, central network monitoring for networks with few nodes based on an E-mail system. When E-mail alarm messages arrive, the sender is identified and the browser starts WBM to read out further diagnostic information. The requirements for sending E-mails are as follows:

- The E-mail function on the IE/AS-i LINK is enabled and the E-mail address of the recipient is configured.
- The E-mail function is enabled for the relevant event,
- there is an SMTP server in your network that can be reached by the IE/AS-i LINK,
- The IP address of the SMTP server is entered on the IE/AS-i LINK.

Parameter	Function
Enable E-mail	Enables/disables the E-mail function.
Recipient	Here, enter the E-mail address to which the IE/AS-i LINK sends an E-mail if a fault occurs.
SMTP server IP address	Here, enter the IP address of the SMTP server over which the E-mail is sent.
SMTP server IP port	IP port via which the mail is sent.
Sender	Freely selectable sender address of the E-mail.

5.2.9.4 SNMP

WBM: “SNMP” tab – Configuration of SNMP for an IE/AS-i LINK

Note

To be able to access additional AS-i parameters of the IE/AS-i LINK from a central management station, you require the private MIB.

The private MIB is located on the IE/AS-i LINK.

Procedure:
In your Internet Browser, enter the following for “Address”:

```
<IP address of the device>/doc/snAsi.mib
```

Save the displayed file with File > Save As... and select the path, file name and “text file” for the file type and enter MIB as the extension.

On this page, you make the basic settings for SNMP.

If an alarm arrives, the IE/AS-i LINK can send traps (alarm messages) to up to two different (network management) stations at the same time. Traps are sent only for events that were specified in the “Events” tab. The IE/AS-i LINK supports SNMP V2.

Parameter	Function
Enable SNMP	Enables/disables the SNMP function.
SNMP read-only	Enables/disables write-protection for SNMP variables.
Read Community String	Editable display of the user name for read access to SNMP variables.
Write Community String	Editable display of the user name for write access to SNMP variables. Here, you can only make modifications if write protection (SNMP read-only) has been disabled.
Enable traps	Enables/disables the trap function.
IP address	Here, you enter the addresses of the stations (SNMP manager no. 1/2) to which the IE/AS-i LINK will send traps (you simply need to enter an address).
Enable	Select this option to enable sending of traps to the required stations (SNMP manager no. 1/2).

Notice

For security, change the community strings. Resetting the device also means re-setting the password to the factory settings.

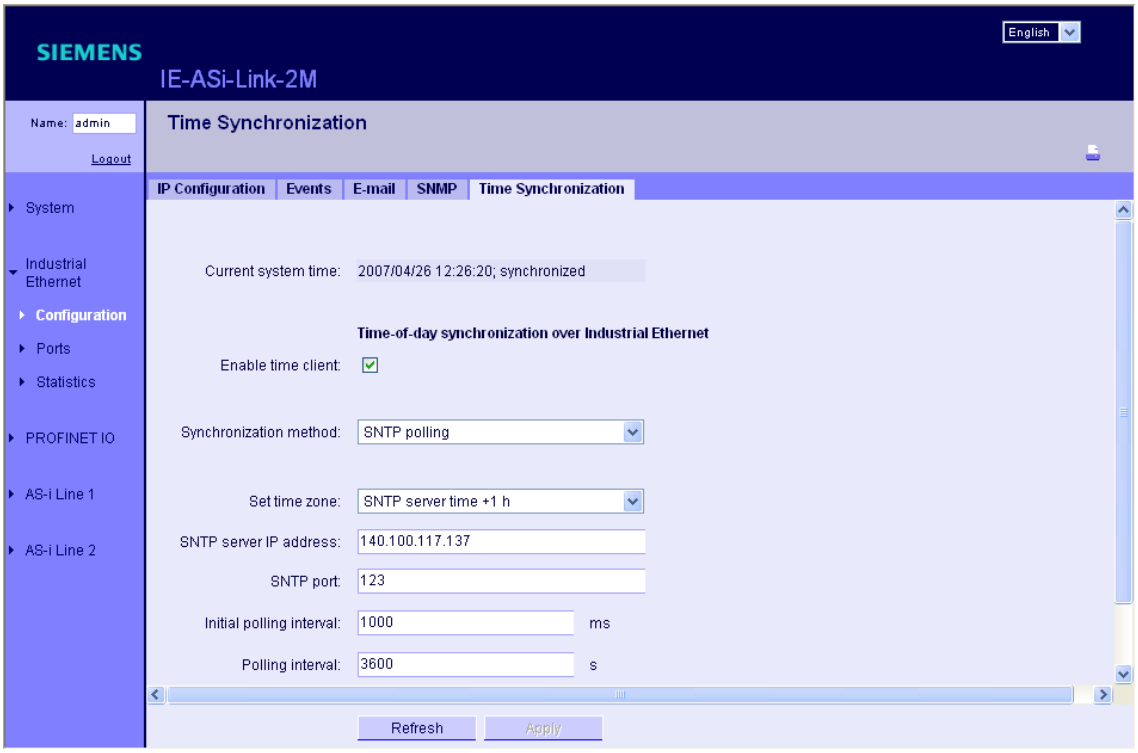
5.2.9.5 Time Synchronization

To use this service, the being used on the relevant server must be opened. The default port is port 123.

WBM: “Time Synchronization” tab

On this page, you can set the method for time synchronization, if you intend to use it.

The time is used for time stamping of the diagnostic events.



Parameter	Function
Current system time	Here, either the time since the last restart or the current time is displayed. If no time is received, “Not synchronized” is also displayed.
Enable time client	Enables/disables the time function.

Parameter	Function
Synchronization method	Here, you can choose from four different protocol types: • SNTP Poll (Simple Network Time Protocol) If you select this type of protocol, you will also need to make the settings for “SNTP server IP address”, “SNTP port”, “Initial polling interval” and “Polling interval”. • SNTP Listening • SIMATIC If you choose the SIMATIC time transmitter, you do not need to make any further settings. • Manual An input box opens in which you can set the current time. The time is then kept with quartz accuracy. If you turn the device off or reset it, this information is lost and must be set again.
Set time zone	Select the required time zone.
SNTP server IP address	Here, you enter the IP address of the SNTP server.
SNTP port	Enter the time port here.
Initial polling interval	Enter the value of the initial polling interval. This value is used until a time is received.
Polling interval	Enter the value of the polling interval. This value is used as soon as a time is received.

5.2.10 Navigation “Industrial Ethernet –> Ports”

5.2.10.1 Ports

Keypad/Display

IND. ETHERNET > Info > Ethernet Port 1 >

Link (physical connection up/down)
Mode (10/100 Mbps, half duplex/full duplex)
Input bytes (number of received bytes)
Output bytes (number of sent bytes)

> Ethernet Port 2 ... (as for Port 1)

WBM: “Ports” Tab – Port Status

This page informs you about the current status of the port.

Parameter	Function
Port	LAN interface of the IE/AS-i LINK
Type	Interface type (on the IE/AS-i LINK: type “TP 100 TX”)
Mode	Displays the transmission mode set by autonegotiation and made up of the transmission rate (10 or 100 Mbps) and the transmission method (full duplex (FD) or half duplex (HD)). Possible values: 10FD, 10HD, 100FD or 100HD
Desired Mode	Displays the desired mode (on the IE/AS-i LINK always: “AutoNegotiation”, in other words negotiation of the transmission mode)
Status	Current port status (on the IE/AS-i LINK always: “forwarding”)
Desired Status	Display of the desired status of the port (for the IE/AS-i LINK always: “Enabled”)
Link	Status of the link to the network: Possible values: • up The port has a valid link to the network, a link integrity signal is being received. • down The port has no link to the network.

5.2.10.2 FDB (forwarding database)

WBM: “FDB” tab

In the forwarding database “FDB”, the IE/AS-i LINK stores the LAN interface (port) over which it communicates with a communication partner (MAC address). The assignment on the IE/AS-i LINK is always dynamic, in other words, the assignment is deleted after an aging time elapses.

Parameter	Function
No.	Consecutive number of the table entry.
MAC Address	MAC address of the connection partner
Port	LAN interface of the IE/AS-i LINK
Status	Display of the assignment status (here: always “dynamic”)

5.2.10.3 ARP (Address Resolution Protocol)

WBM: “ARP” tab

The ARP table specifies the assignment between the LAN interface (port) and the MAC address and the IP address of the last connection partner. The assignment on the IE/AS-i LINK is always dynamic, in other words, the assignment is deleted after a certain time elapses.

Parameter	Function
No.	Consecutive number of the table entry.
MAC Address	MAC address of the connection partner
IP address	Display of the IP address
Port	LAN interface of the IE/AS-i LINK
Type	Display of the assignment type (here: always “dynamic”)

5.2.11 Navigation “Industrial Ethernet –> Statistics”

Counting and evaluating received and sent packets

The IE/AS-i LINK has internal statistics counters (RMON Remote Monitoring) with which counts the number of received and sent packets for the ports according to the following criteria:

- Packet size
- Packet type
- Bad packets

This information provides you with an overview of the data traffic and any network problems that might occur.

5.2.11.1 Throughput

Keypad/Display

IND. ETHERNET > Info > Ethernet Port 1 >

Link	(see Section 5.2.10.1)
Mode	(see Section 5.2.10.1)
Input bytes	(number of received bytes)
Output bytes	(number of sent bytes)

> Ethernet Port 2 ... (as for Port 1)

WBM: “Throughput” Tab

Parameter	Function
Port	LAN interface of the IE/AS-i LINK (1 or 2)
Bytes in	Number of received bytes
Bytes out	Number of sent bytes
Packets in	Number of received packets
Packets out	Number of sent packets
Utilization	Displays the bus utilization as a percentage (%). If bus utilization is below 1%, there is no display.
Max. Utilization	Displays the peak value of bus utilization as a percentage (%)
Reset	The “Reset” button resets the counters.

5.2.11.2 Packet Type

WBM: “Packet Type” Tab – received packets sorted according to type

The “Packet Type” page displays how many frames of the type unicast, multicast, and broadcast were received at each port.

Clicking on the “Reset” button resets this counter. If you click on an entry in the Port column, the “Graphic statistics: Packet Type” page is displayed for the selected port. You then see a configurable graphical representation of the counter value.

Parameter	Function
Port	LAN interface of the IE/AS-i LINK (1 or 2)
Unicast	Number of packets to the unicast recipient address
Multicast	Number of packets to the multicast recipient address
Broadcast	Number of packets to the broadcast recipient address

5.2.11.3 Packet Size

WBM: “Packet Size” Tab – received packets sorted according to length

This page displays how many packets of which size were received.

If you click on an entry, the “Graphic statistics: Packet Size” page is displayed for the selected port. You then see a configurable graphical representation of the counter value.

Parameter	Function
Port	LAN interface of the IE/AS-i LINK (1 or 2)
64	Number of packets with 64 bytes
65–127	Number of packets with 65–127 bytes
128–255	Number of packets with 128–255 bytes
256–511	Number of packets with 256–511 bytes
512–1023	Number of packets with 512–1023 bytes
1024–1518	Number of packets with 1024–1518 bytes

5.2.11.4 Error

WBM: “Error” Tab – counting and evaluation of transmission errors

This page displays information on any errors that may have occurred and allows diagnostics.

If you click on an entry, the Packet Error Statistics graphic is displayed. You then see a configurable graphical representation of the counter value.

Parameter	Function
Port	LAN interface of the IE/AS-i LINK (1 or 2)
CRC	Number of packets with a valid length but bad checksum
Undersize	Number of packets that were too short with valid checksum
Oversize	Number of packets that were too long with valid checksum
Jabbers	Number of packets that were too long without valid checksum
Collisions	Number of collisions that occurred

5.2.12 Navigation “PROFINET IO –> Status”

This page displays information on PROFINET IO.

5.2.12.1 Status

Keypad/Display

PROFINET > Info > Device name > Change PROFINET device name
IP address Controller
Controller name (PROFINET device name of controller)
Connection (AR status online/offline)
Controller (Controller status RUN/STOP)
Update time [ms]

PROFINET > Error

WBM: “Status” Tab

Parameter	Function
PNIO device name	Displays the PROFINET device name of the link
Controller IP address	Displays the IP address of the PROFINET IO controller
Controller name	Displays the PROFINET device name of the controller
Connection status	Display of the connection status (online / offline) between link and PROFINET IO controller. See also Section 8.2.1.8.
Controller status	Display of the operating state of the controller (RUN / STOP)
Update time	Display of the set update time in milliseconds

5.2.13 Navigation “AS-i Line 1 –> Overview”

All the information in this section also applies to AS-i line 2. With a single master, the line number is not displayed.

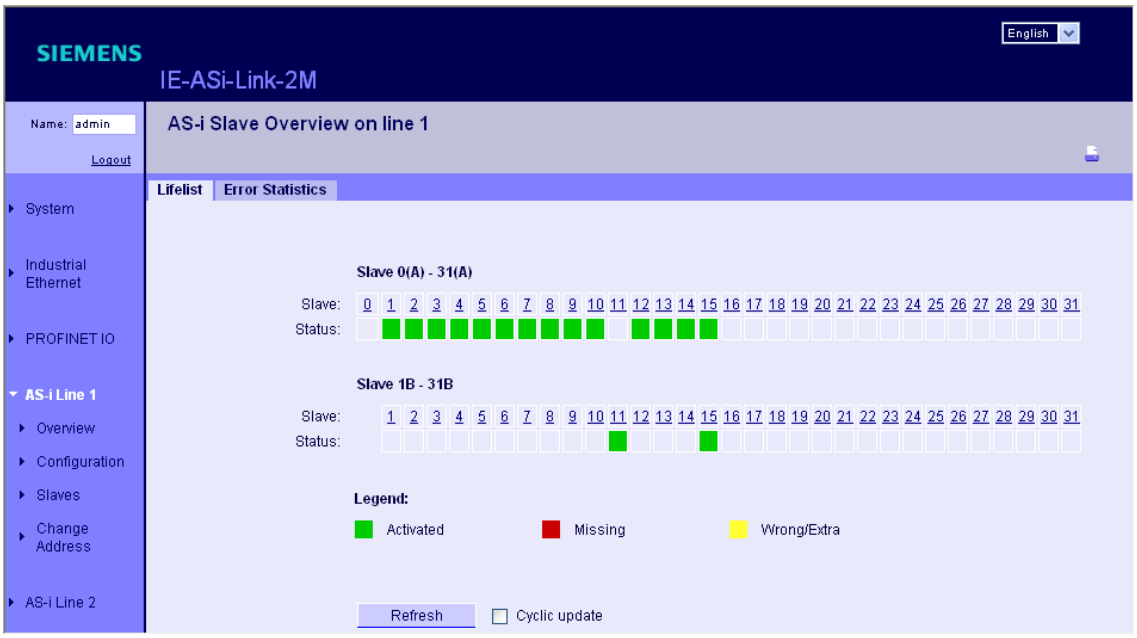
5.2.13.1 Lifelist

Keypad/Display

AS-i Line 1 > Lifelist (displays all detected slaves)

Description of the follow-on menus as of Section 5.2.14.2

WBM: “Lifelist” Tab



Parameter	Function
0(A) – 31(A); 1B to 31B	Addresses of the slaves 1–31 (slave 0 = reserved). If you have A/B slaves, these are displayed extra in a second table.
Status	Displays the status of the slaves (activated, missing, wrong/extra)

Note

If you click on the address of a slave in the “Slave” row of the table, you open the “Diagnostics” page directly (Navigation: AS-i Line > Slaves > Diagnostics).

5.2.13.2 Error Statistics

Keypad/Display

AS-i Line 1 > Error List > Display... (select slave and “OK”)

Slaves on which an error has occurred are indicated by “x” in the error list.

You will find more information on the errors of the individual slaves in Section 5.2.15.1.

AS-i Line 1 > Statistics > Line statistics

AS-i power failures
Short to ground

Slave failure
Missing frame
Bad frame
Peripheral error
Protocol error
Bad master frame

Reset counters > Reset all counters

The “Line statistics” list displays all the error types and the total number of errors on the AS-i line.

WBM: “Error Statistics” Tab

This page displays the number of errors on the AS-i line.

Note

If you click on the address of a slave in the “Slave” row of the table, you open the page AS-i Line > Slave > Diagnostics directly.

Parameter	Function
Slave	Slave address
Error	Slaves on which errors occurred marked red.
AS-i Power Fail	Number of power supply failures on the AS-Interface
AS-i short to ground	Number of ground shorts on the AS-Interface
Show	Enables/disables the display of the corresponding error.
Error	Shows how many errors of this type occurred (see Section 8.2.1.14). The following errors are listed: • Slave failure • Missing slave frame • Bad slave frame • Slave I/O error • Slave protocol error • Bad master frame

Parameter	Function
Quotient	Shows the proportion of a specific error type compared with the total errors as a percentage.
Reset	The “Reset” button resets the counters.

5.2.14 Navigation “AS-i Line 1 –> Configuration”

5.2.14.1 Status

Keypad/Display

AS-i line 1 > Line status >

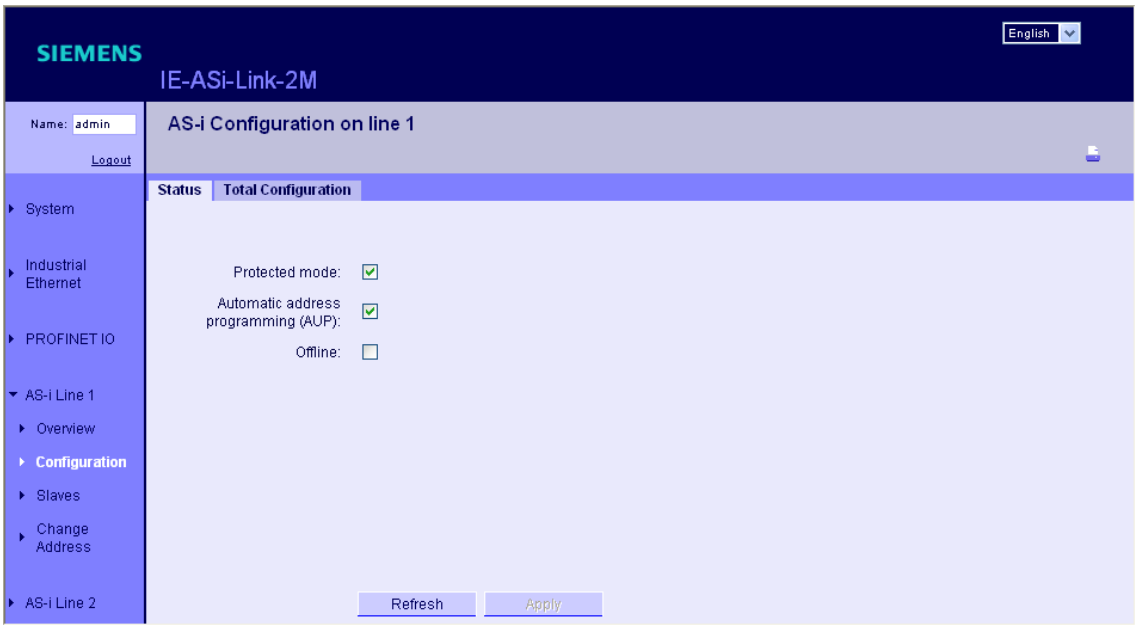
Protected > enable / disable
Autoprog. > enable / disable
Offline > “Online” / “Offline”

System error (image of the “SF” LED (line))
Configuration error (image of the “CER” LED)

AS-i powerfail (image of the “APF” LED)
Short to ground

The functions “Protected” (protected mode or configuration mode), “Autoprog.” (autoprogramming) or “Offline” are enabled, if the relevant check box is selected (enable with “OK”). Exit the menu with “ESC” after enabling/disabling the functions.

WBM: “Status” Tab



Parameter	Function
Protected mode	Select the required mode. You can choose between the following modes: • Protected mode (option enabled) • Configuration mode (option disabled)
Automatic address programming (AUP)	Enables/disables automatic address programming. If this option is selected, when you replace a slave, the new slave is given the address of its predecessor.
Offline	Enable this option to switch to offline mode (disabled = online). In “Offline” mode, only the data record interface is active; in other words, no AS-i frames are sent.

5.2.14.2 Total Configuration

Keypad/Display

AS-i Line 1 > Lifelist > Display... (select slave and “OK”)

Config.	>	Change configuration
Parameter	>	Change parameters
Bin. I/O	>	Change binary Inputs/outputs
Analog	>	Change analog inputs/outputs
Status		
Statistics	>	Reset all counters
Statistics	>	Reset all counters
String transfer	>	Write (string transfer to slave)

or

AS-i Line 1 > Slave Info > Display... (select slave and “OK”)

Config.	>	Change configuration
...		

Select a slave with the cursor buttons in the “Lifelist” or “Info” menu. Pressing “OK” opens the “Config.” menu.

From the “Configuration” menu, use the cursor buttons “right”/“left” to change to the other menus “Parameters”, “Bin. I/O”, “Analog” etc. With the “up”/“down” cursor buttons, you change to the next slave. The “OK” button opens the follow-on menu in which you can change the values. Exceptions: The “Status” and “Statistics” menus have no display function.

Change the values with the “up”/“down” cursor keys. To transfer the changed values to the slave, press the “OK” button.

Note

Remember that any values changed here will be overwritten by the configured values the next time you restart.

AS-i Line 1 > Act –> Conf > Adopt Act –> Conf

With this function, you adopt the detected actual configuration of the slave as the configured configuration on the IE/AS-i LINK.

WBM: “Total Configuration” Tab

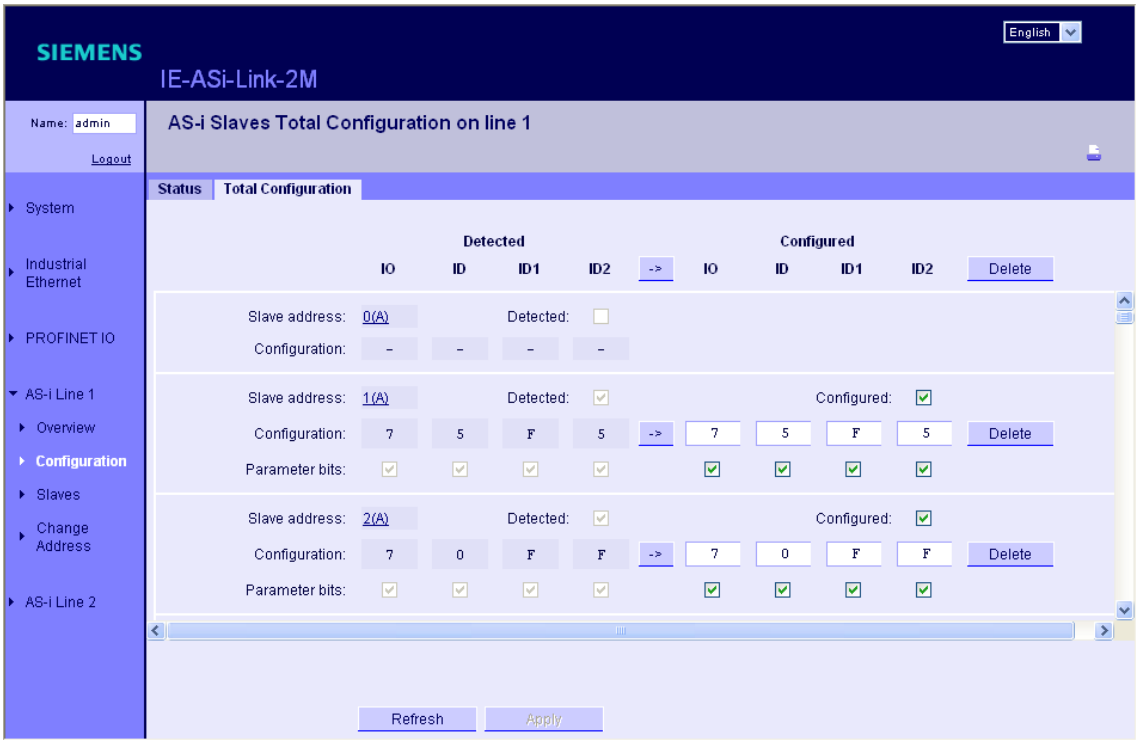
The page is divided into two areas and includes all A and B slaves detected on this line:

- Detected

  Here, you can see all the slaves detected on this line including their detected configuration (display boxes).

- Configured

  Here, you can set the configuration data for the slaves.



Parameter	Function
Header row of the table	
–>	Accept configuration data of all slaves Click this button if you want to adopt the detected configuration data of all slaves (adopt actual configuration as desired configuration).
Delete	Click this button if you want to delete all entries for all slaves.
Slave rows	
Detected	If the slave is detected, a check mark is set here.
Configured	Enables/disables the “Configured” option. The “–> “ button adopts the values of the detected slave.
Slave address	Address of the slave 0A–31A; with A/B slaves also 1B–31B.
Configuration	Configuration data of the slaves
Parameter bits	Parameter bits of the slaves In the “Detected” area, you can see the current parameter bits, in the “Configured” area, you can configure the parameter bits. When the AS-i slaves are activated, the configured AS-i parameters are transferred to them.
IO	Display/configuration of the IO code of an AS-i slave
ID	Display/configuration of the ID code of an AS-i slave
ID1	Display/configuration of the extended ID1 code of an AS-i slave
ID2	Display/configuration of the extended ID2 code of an AS-i slave
–> (row-specific)	Accept configuration data of the slave Click this button if you want to adopt the detected configuration data of the slave (adopt actual configuration as desired configuration).
Delete (row-specific)	Click this button if you want to delete the information on this slave from the configuration.

Note

The content of the screen is saved on the IE/AS-i LINK only after you click the “Apply” button.

For information on “parameters” and the IDs of the “Configuration” (I/O configuration, ID code, ID1 code and ID2 code) /5/.

5.2.15 Navigation “AS-i Line 1 –> Slaves”

Common function of the WBM tabs

The following drop-down list box is included in all tabs of this page:

Using the drop-down list box, you can select the slave whose diagnostic data you want to view. You can select the slave directly using the drop-down list box or browse with the arrow buttons.

5.2.15.1 Diagnostics

Keypad/Display

AS-i Line 1 > Error List > Display... (select slave and “OK”)

Statistics > Reset error counters
Slave failure
Missing frames
Bad frame

Statistics > Reset error counters
I/O Error
protocol error
Bad master frame

Slaves on which an error has occurred are indicated by “x” in the error list. Select a slave with the cursor buttons. Pressing “OK” opens the “Statistics” list. You can open the second “Statistics” list with the “right” cursor button. You can reset the error counter of a selected error type with “OK”.

AS-i Line 1 > Lifelist > Status (display of the slave status)

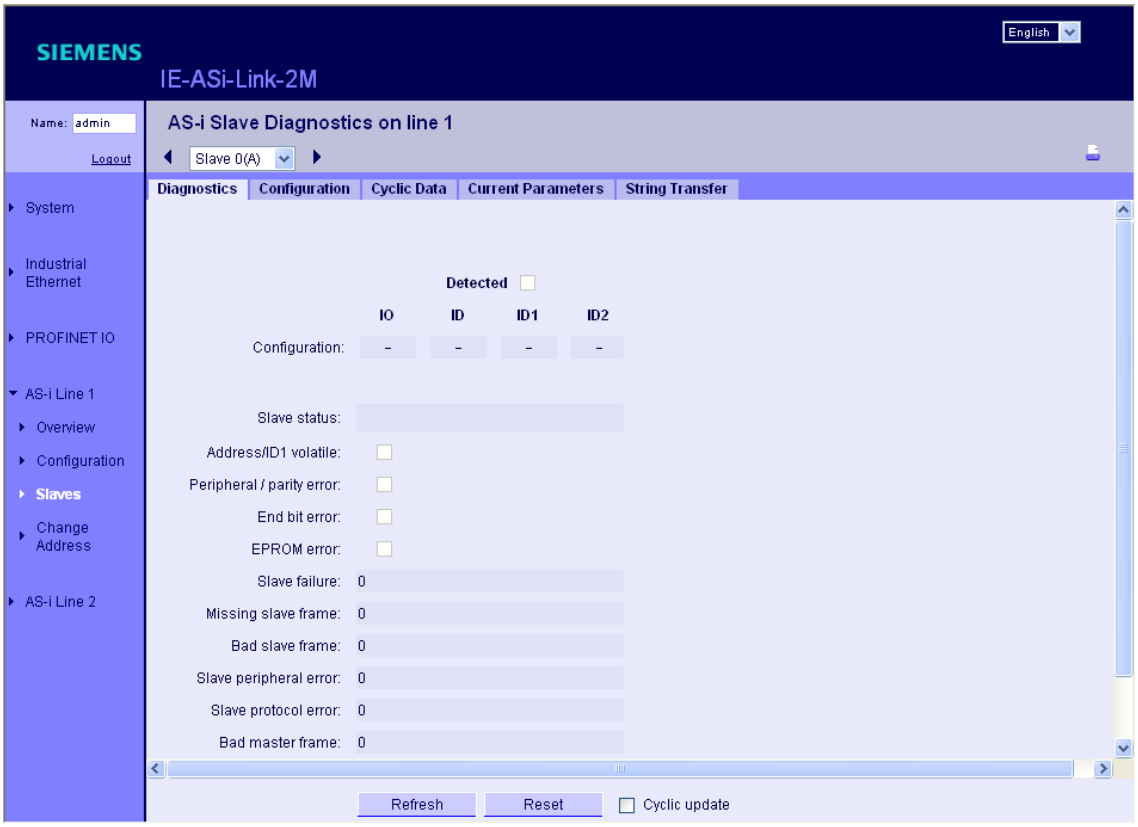
or

AS-i Line 1 > Slave Info > Status (display of the slave status)
Address/ID1 volatile
I/O error
End bit error
EEPROM error

Select a slave with the cursor buttons in the “Lifelist” or “Info” menu. Pressing the “OK” button brings you to the “Config.” (see Section 5.2.14.2).

WBM: “Diagnostics” Tab

This page displays all the relevant data of the selected slave.



Parameter	Function
Detected	If the slave is detected, a check mark is set here.
IO	Display of the IO code of an AS-i slave
ID	Display of the ID code of an AS-i slave
ID1	Display of the extended ID1 code of an AS-i slave
ID2	Display of the extended ID2 code of an AS-i slave

Parameter	Function
Error	Displays the status currently being signaled by the slave (check mark): • Address/ID1 volatile • I/O / parity error • End bit error • EPROM error Shows how many errors of a type have occurred. The following errors are listed: • Slave failure • Missing slave frame • Bad slave frame • Slave I/O error • Slave protocol error • Bad master frame Some errors occur in tandem (for example slave failure + missing/bad slave frames). Note To find out which error messages the slave supports, refer to the slave data sheets.
Reset	With the “Reset” button, you can reset the error counter of the slave to 0.

5.2.15.2 Configuration

For the content and functions, refer to Section 5.2.14.2.

5.2.15.3 Cyclic Data

The display menus “Bin. I/O” and “Analog” and the WBM tabs “Cyclic Data” display the cyclic input/output data of the AS-i slave. The output data of the slave can also be modified here during commissioning. This allows the complete I/O test to be performed for binary or analog slaves without requiring a connection to the higher-level PROFINET IO controller.

Note

Note that any changes made here remain only until the PROFINET IO controller starts up and are then overwritten by the process output data. If a PROFINET IO controller is connected, the values are overwritten again immediately.

Keypad/Display

AS-i Line 1 > Lifelist > display... (select slave and “OK”)

Config.	> Change configuration
Parameter	> Change parameters
Bin. I/O	> Change binary Inputs/outputs
Analog	> Change binary inputs/outputs

or

AS-i Line 1 > Slave Info > Display... (select slave and “OK”)

Config.	> Change configuration
...	

Select a slave with the cursor buttons in the “Lifelist” or “Info” menu. Pressing “OK” opens the “Config.” menu.

From the “Configuration” menu, use the cursor buttons “right”/“left” to change to the other menus “Parameters”, “Bin. I/O”, “Analog” etc. With the “up”/“down” cursor buttons, you change to the next slave. The “OK” button opens the follow-on menu in which you can change the values.

Navigate to the relevant value with the “right”/“left” cursor buttons.

Change the values with the “up”/“down” cursor keys. To transfer the changed values to the slave, press the “OK” button.

WBM: “Cyclic Data” Tab

Parameter	Function
Binary inputs	Bit 3 / Bit 2 / Bit 1 / Bit 0
Binary outputs	Enables/disables the following output bits: Bit 3 / Bit 2 / Bit 1 / Bit 0
Analog inputs	Channel 1 / Channel 2 / Channel 3 / Channel 4
Analog outputs	Entry of the value to be written on channel x. Channel 1 / Channel 2 / Channel 3 / Channel 4

5.2.15.4 Current Parameters

With the “Parameters” display menu or the “Current Parameters” WBM tab, you can change the current parameters of a slave and transfer the changed values to the slave.

Note

Note that changes remain only until the PROFINET IO controller starts up. There is then a restart with the configured parameter values. If the PROFINET IO controller is connected, the values are overwritten only when the controller next starts up.

Keypad/Display

AS-i Line 1 > Lifelist > Display... (select slave and “OK”)

Config. > Change configuration
Parameter > Change parameters

or

AS-i Line 1 > Slave Info > Display... (select slave and “OK”)

Config. > Change configuration
Parameter > Change parameters

For information on navigating in the menus and working with the buttons, refer to Section 5.2.15.3.

Apart from the current values, the “Parameters” menu shows the echo of the slave. Below the “Echo” box, there are boxes for entering parameters. Navigate to the relevant value with the “right”/“left” cursor buttons.

Change the values with the “up”/“down” cursor keys. To transfer the changed values to the slave, press the “OK” button.

WBM: “Current Parameters”

You can set the parameter bits on this page. The bits are sent when you click the “Apply” button. The parameter echo is returned.

Parameter	Function
Parameter bits	Enables/disables the following parameter bits: Bit 3 / Bit 2 / Bit 1 / Bit 0
Parameter echo	The AS-i slave transfers its current parameter value in the response (parameter echo displayed).

5.2.15.5 String Transfer

Calls can be transferred to the slave with the “String Transfer” function. The messages returned by the slave are displayed.

Note

Note that changes remain only until the PROFINET IO controller starts up. If a PROFINET IO controller is connected, the values are overwritten again immediately.

Note

Not all slaves support string transfer. To find out which functions your slave supports, refer to the data sheets of the slave.

Keypad/Display

AS-i Line 1 > Lifelist > Display... (select slave and “OK”)

Config.	>	Change configuration
Parameter	>	Change parameters
Bin. I/O	>	Change binary Inputs/outputs
Analog	>	Change analog inputs/outputs
Status		
Statistics	>	Reset all counters
Statistics	>	Reset all counters
String transfer	>	Write (string transfer to slave)

or

AS-i Line 1 > Slave Info > Display... (select slave and “OK”)

Config. > Change configuration

...

Select a slave with the cursor buttons in the “Lifelist” or “Info” menu. Pressing “OK” opens the “Config.” menu.

From the “Configuration” menu, use the cursor buttons “right”/“left” to change to the other menus “Parameters”, “Bin. I/O”, “Analog” etc. With the “up”/“down” cursor buttons, you change to the next slave. The “OK” button opens the follow-on menu in which you can change the values. Exceptions: The “Status” and “Statistics” menus have no display function.

Change the values with the “up”/“down” cursor keys. To transfer the changed values to the slave, press the “OK” button.

WBM: “String Transfer” Tab

Parameter	Function
Command	You can choose from the following calls: • Read_Identification_String; with profile 7.4 • Read_Diagnostic_String; with profile 7.4 • Read_Parameter_String; with profile 7.4 • Write_Parameter_String; with profile 7.4 • Read/Write_CTT2_String; with profile 7.5.5, 7.A.5, B.A.5
Send buffer	Enter the slave data to be sent
Receive buffer	Display of the received slave data. This box can take up to 200 bytes and line breaks where necessary.

5.2.16 Navigation “AS-i line 1 –> Change Address”

5.2.16.1 Change Address

Keypad/Display

AS-i Line 1 > Change addr. > Change slave address

The “new” address box displays only free AS-i addresses. Exit the menu with “OK” after completing the changes.

WBM: “Change Address” Tab

On this page, you can change the addresses of the individual slaves.

Parameter	Function
Old slave address	Select the slave whose address you want to change.
New slave address	Select the new slave address you want to assign to the slave (the free addresses are displayed).

5.2.16.2 Change ID1

Keypad/Display

AS-i Line 1 > Change ID1 > Set ID1 (only for slave “0”)

WBM: “Change ID1” Tab

Parameter	Function
Slave address	Displays the slave 0(A). ID1 can only be changed for this slave.
ID1	Configuration of the extended ID1 code of an AS-i slave (Diagnostics). Note: ID1 can only be changed for slave 0(A).

5.2.16.3 Automatic Addressing

If you select this option, a new slave added to the AS-i line with AS-i address “0” is assigned the next free address.

Disable this option once you have connected all required slaves.

Keypad/Display

AS-i Line 1 > Address help > enable/disable

WBM: “Automatic Addressing” Tab

Parameter	Function
Automatic addressing	Enables/disables addressing support

❑

6 Configuring with STEP 7 or a GSDML File

This chapter...

This chapter explains how to configure the IE/AS-i LINK module as a PROFINET IO device in the PROFINET I/ system and the AS-i slaves with STEP 7.

If you use a different configuration system, you can configure the IE/AS-i LINK and the AS-i slaves with the help of the GSDML file.

Warning

You can change the configuration of the IE/AS-i LINK during operation when there is a connection to the PROFINET IO controller or write process data of the real process.

The change in the configuration or to process data can trigger unexpected reactions in the process that can lead to death, serious injury or damaged property.

Consider the consequences before you act. Take the following precautions:

- Restrict the ways of accessing the IE/AS-i LINK.
- Assign a secure password for access to Web Based Management.
- Install a physical emergency stop circuit for the machines or the process.

6.1 General Information on Configuration

6.1.1 Basics

Significance of the Configuration

Communication with the IE/AS-i LINK (as an IO device) differs depending on the device you are using as the PROFINET IO controller For fully integrated communication between the PROFINET IO controller and AS-i slaves, the IE/AS-i LINK must be configured in the IO system.

Available Configuration Tools

You can configure with the following project engineering tools:

- Products from other manufacturers
- SIMATIC STEP 7 (SIMATIC S7)
- SIMATIC NCM PC

The relevant functions for configuring the IE/AS-i LINK are identical in STEP 7 and NCM PC. The STEP 7 functions described below also apply to NCM PC.

To configure with the GSDML file, STEP 7 V5.4 or higher is required.

GSDML file

Both when configuring with a third-party product or with STEP 7, module-specific data of the IE/AS-i LINK must be imported using the GSDML file.

The GSDML file (XML format) contains the information on the IE/AS-i LINK that is required by the project engineering tool (here: STEP 7).

You will find the GSDML file on the supplied CD. The GSDML file can also be downloaded from the Internet at:
http://support.automation.siemens.com/WW/view/en/23742537

DIB/BMP File

To allow graphic representation of the IE/AS-i LINK, some configuration tools, for example STEP 7, use bitmap files. These are also supplied on the accompanying CD.

6.1.2 Choosing the Configuration Method

Configuring with STEP 7 or the GSDML File

Configuration with STEP 7 or the GSDML file depends on the configuration tool you are using.

- You are using STEP 7 as of V5.4 SP3:
  - ▶ Configuration with STEP 7 (see Section 6.2)

    Select the IE/AS-i LINK from the following folder of the catalog in HW Config:

    PROFINET IO / Gateway / IE/AS-i Link PN IO / 6GK1 411-2ABx0 / V1.0/V2.0
- You are using STEP 7 V5.4 / V5.4 SP1 or a third-party configuration tool:
  - ▶ Configuration with the GSDML file (see Section 6.3)

    Select the IE/AS-i LINK from the following folder of the catalog in HW Config:

    PROFINET IO / Gateway / IE/AS-i Link PN IO / GSD / .... / V1.0/V2.0

Functions that depend on the PROFINET IO controller

The configuration of the Ethernet ports and the topology supported by firmware version 2.0 of the IE/AS-i LINK can only be used if the link is connected to a PROFINET IO controller with enhanced diagnostics capability (for example with an S7-400 CPU with firmware version V5.0 or higher).

When configuring the IE/AS-i LINK with firmware version 2.0 and controllers without enhanced diagnostics capability, select the IE/AS-i LINK from one of the following folders in the HW Config catalog:

PROFINET IO / Gateway / IE/AS-i Link PN IO / 6GK1 411-2ABx0 / V1.0

PROFINET IO / Gateway / IE/AS-i Link PN IO / GSD / .... / Migration / V2.0

Configuration Sequence

The configuration of the IE/AS-i LINK and the AS-i slaves is described in the following steps:

1. Importing the GSDML file in “HW Config” (STEP 7) – Section 6.3 only
2. Configuring the IE/AS-i LINK
3. Configuring and assigning parameters to the AS-i slaves

6.2 Configuring with STEP 7

Note

The configuration described in Section 6.2 is supported by STEP 7 as of version V5.4 SP3.

6.2.1 Configuring the IE/AS-i LINK

Placing the link in the PROFINET IO system

4. Select the IE/AS-i LINK in the catalog of HW Config in PROFINET IO > Gateway > IE/AS-i Link PN IO > 6GK1 411-2ABx0 > V1.0 or V2.0.

   The IE/AS-i LINK is available as double master (order number ...-2AB20) or as single master (order number ...-2AB10).

5. Placing the link in the PROFINET IO system. In the lower part of the configuration table, the modules are mapped to the slots of the IE/AS-i LINK.

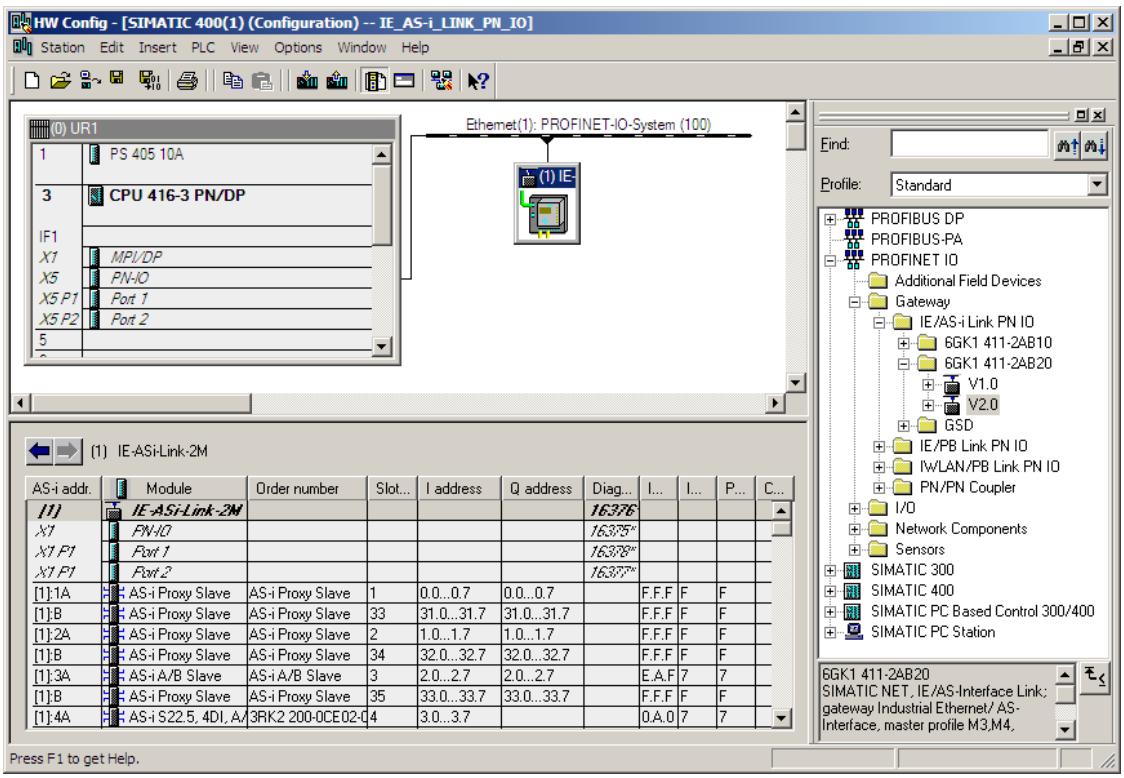


Figure 6-1 HW Config: PROFINET IO System with IE/AS-i LINK

Slot assignment in the configuration table of HW Config

The configuration table in the station window of HW Config shows the slot assignment of the IE/AS-i LINK. The first column “AS-i addr.”shows the AS-i address. The first AS-i address 0 is used for the IE/AS-i LINK itself or for the AS-i line 1 substitute. As of firmware version 2.0, slot 0 is divided into four rows:

- Row 1, AS-i addr. “*[1]*”:

  Proxy for the configuration of the specific AS-i line properties, [1] is the name of the AS-i line.

- Row 2, AS-i addr. “*X1*”:

  Proxy for the configuration of the PROFINET properties of the LAN interface of the module

- Row 3, AS-i addr. “*X1 P1*”:

  Proxy for the configuration of Ethernet port 1

- Row 4, AS-i addr. “*X1 P2*”:

  Proxy for the configuration of Ethernet port 2

After slot 0, the following slots are assigned placeholder modules for 62 A/B slaves (AS-i addr. of the I/O modules: 1A, B, 2A etc.). With a double master, the number of the AS-i line is preceded by square brackets (AS-i addr.: [1]:1A, [1]:B, [1]:2A etc.).

With a double master, the placeholder module 31B is followed by the proxy for AS-i line 2 with the name “[2]”. This is followed in turn by the placeholder modules for the 62 slaves of line 2 (AS-i addr.: [2]:1A, [2]:B, [2]:2A etc.).

The placeholder modules have the default configuration $FFFF_H$ so that they already have priority in the AS-i slave settings configured on the IE/AS-i LINK module.

Parameter Assignment for the IE/AS-i LINK

By double-clicking on the IE/AS-i LINK (icon in the PROFINET IO system), you open the properties dialog of the IE/AS-i LINK. Here, you can set the following parameters:

- “General” Tab
  - Setting the PROFINET device name of the module
  - Setting the device number
  - Entering a comment
  - The “Assign IP address via IO Controller” option is enabled in the default settings.
- “Identification” tab

  If required, you can assign the plant designation and the location identifier for the module in this tab.

Configuring the PROFINET IO properties of the Ethernet Interface

This function is available on the IE/AS-i LINK as of firmware version V2.0.

If you double-click on row 2 in the configuration table (AS-i addr.: "*X1*"), you open the dialog for the PROFINET IO properties of the IE/AS-i LINK. Here, you can set the following parameters:

- "General" Tab
  - Display of the essential master data of the module
  - Setting of the name for the PROFINET IO properties of the Ethernet interface
  - Entering a comment
- "Addresses" tab

  Setting of the diagnostic address for the PROFINET IO communication of the IE/AS-i LINK
- "IO Cycle" tab
  - Setting the update time for the IP cycle
  - Setting the number of update cycles with missing I/O data

Configuring ports "Port 1" and "Port 2"

This function is available on the IE/AS-i LINK as of firmware version V2.0.

When you double-click on row 3 or row 4 (AS-i addr.: "*X1P1*" or "*X1P2*") in the configuration table opens the properties dialog of Port 1 or Port 2 of the LAN interface of the IE/AS-i LINK. You can set the following parameters for the relevant port:

- "General" Tab
  - Setting the port name
  - Entering a comment
- "Addresses" tab

  Setting the diagnostic address of the port
- "Topology" tab

  Here, you can interconnect the selected port of the IE/AS-i LINK with the port of another device in the IO system.
  - The "Local port" shows the selected port of the IE/AS-i LINK.
  - In the "Remote port" drop-down list box, you can select the required port from the devices available in the IO system.
  - The "Medium" box displays the connection.

  The "cable name" cannot be selected for copper.
  The "line data" box is only available for devices with IRT capability.

- “Options” tab

  In the “Connection” box, you can set the automatic monitoring of the connection to the PROFINET IO controller.

  - The default is “Automatic setting”: Transmission rate and direction (full duplex/half duplex) of the data transmission are set to the optimum value by the connected partners.
  - If you select “Automatic setting (monitor)”, the connection status is monitored. If there is a disruption on the connection, a diagnostic interrupt (error type 8008_H) is generated at the diagnostic address of the port.

  When automatic setting is selected, the “runtime check” cannot be used.

Configuring the Properties of the AS-i Line

If you double-click on row 1 for AS-i line 1 (AS-i addr.: “*[1]*”) or on row 67 for AS-i line 2 (AS-i addr.: “*[2]*”) in the configuration table, you open the properties dialog of the relevant AS-i line and can set the following parameters:

- “General” Tab
  - Display of the essential master data of the module
  - Entering a comment
- “Addresses” tab

  Setting the diagnostic address of the AS-i line
- “Packing”

  Here, you can pack the address areas reserved on the link for the AS-i slaves. Reducing the size of the address areas optimizes the memory available on the controller.

  In the default assignment with placeholder modules, an area of 1 byte is reserved for each I/O module. Since a maximum of 4 bits can be assigned to a digital AS-i slave in one transfer direction, data exchange is possible with any slave. Packing concentrates the required address areas of the I/O modules without any gaps and releases the memory that is not required. The packed data is transferred in a data field assigned to the line proxy.

  The fields in the “Pack” tab of the properties dialog have the following meaning:

  - The required length of the data field of the line proxy is displayed in bytes in the “Inputs” and “Outputs” boxes under “Assigned Length”.
  - The “Start” input box shows the start address of the data field. You can assign a different value here.
  - In the “Reserved Length” input box, you can reserve address space for future expansion by increasing the proposed value.

Notice

Packing the address spaces cannot be reversed.

Note

You should only use the “Pack” function when the configuration of the IE/AS-i LINK and all the I/O modules required for the slaves have been completed.

If you want to expand the AS-i line later, enter a value in “Reserved Length” that is higher than the value displayed in “Assigned Length”.

If you use packing, access to the I/O data of a failed slave does not cause an I/O access error.

- “Parameters” tab
  - “Diagnostic interrupt”

    Here, you set the output of various diagnostic interrupts (see also Section 9.2.2):

    – Line diagnostics (AS-i powerfail, short to ground, I/O error)

    – Configuration diagnostics (extra slave)
  - “Address programming”

    Here, you can enable or disable automatic or manual address programming for the underlying AS-i line (see also Section 10.1).

6.2.2 Configuring and Assigning Parameters to the AS-i Slaves

Configuration of the I/O modules for the AS-i slaves

Select the IE/AS-i LINK in HW Config. In the default assignment, the slots of the IE/AS-i LINK are occupied by placeholder modules for the AS-i slaves. You can open the properties dialog of a placeholder module (I/O module) by double-clicking on the relevant row in the configuration table. The properties dialog has the following three tabs:

- “General” tab

  Here, you can change the name of the I/O module and enter a comment.

- “Configuration” tab

  You set the configuration of the I/O module in this tab.

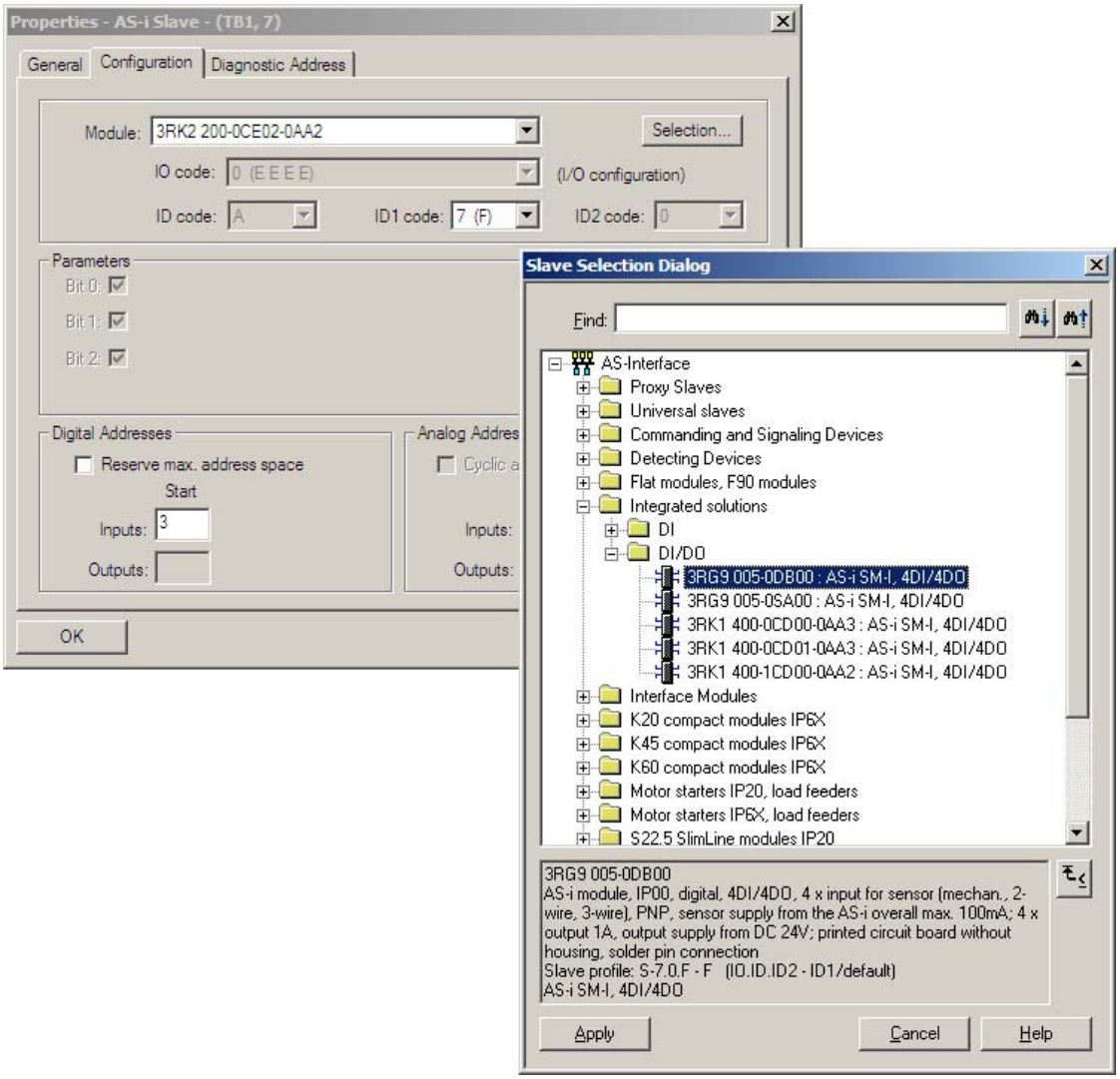


Figure 6-2 The Properties Dialog of an AS-i Slave – “Configuration” Tab and open “Slave Selection Dialog”

You can select the I/O module to be used in two different ways:

– “Module” drop-down list box

  This contains the following slave types:

  – The AS-i placeholder
  – AS-i Standard Slave Universal
    AS-i A/B Slave Universal
  – Siemens modules arranged according to order number

– “Selection...” button

  Click the button to open the “Slave selection dialog”. This contains the following slave types:

  – The AS-i placeholder
  – AS-i Standard Slave Universal
    AS-i A/B Slave Universal
  – Siemens modules arranged according to groups and applications

In the “Configuration” tab, you set the identification parameters for an AS-i placeholder or a universal slave and set the parameters and addresses for all slave types.

– I/O Code

– ID Code, ID1 Code, ID2 Code

  The I/O and ID codes set the type and length of the data for specific slaves.

– Parameter

  The AS-i parameter bits 0 to 3 have vendor- or slave-specific settings. For more information, refer to the documentation of the relevant AS-i slave device. The default setting of the parameter bits is “1”.

The “Digital addresses” and “Analog addresses” boxes display the start addresses of the inputs and/or outputs. Unused addresses are grayed out depending on the type of slave being used. You can change displayed start addresses over the keyboard.

– Digital addresses

  “Reserve max. address space” option:
  This option is relevant if you want to pack the address area of the AS-i line on which this module is located later (see also Section 6.2.1, Configuring Properties of the AS-i Line, “Packing”).

  Enable this option, if you want the full address area (4 input bits, 4 output bits) to be reserved for the module after packing.

– Analog addresses

  “Cyclic analog data”:
  This option is activated as default. The analog data of the slave is accessed in cyclic data traffic.

  If you disable the “cyclic analog data” option, you can only access the analog data of the slave via date records.

The configuration options differ depending on the type of I/O module as follows:

– AS-i placeholder module

  The first four identifiers of an AS-i placeholder module (I/O Code, ID Code, ID1 Code, ID2 Code) are set to the value “F_H”. The values already configured on the link module are adopted for this module only when these defaults are set. The subsequent parameter bits are then irrelevant in this case. Once again, the values already configured on the link are adopted.

– Universal slaves

  You can configure universal slaves (AS-i A/B slave, AS-i standard slave) freely according to the requirements of the particular slave device.

  Whether or not the IDs assigned in the properties dialog match the type of the actually connected AS-i slave is not checked by STEP 7.

– Siemens modules

  When you select a specific Siemens module, the IO code is set in every case, other identifiers or parameters may be set depending on the slave type. Set parameters are not active and grayed out. You can set active parameters.

Note

If a value in the configuration data (I/O code, ID code, ID1 code, ID2 code) is not F_{hex}, the configuration data and AS-i parameters stored on the link will be overwritten by the values set here in STEP 7 while the PROFINET IO connection is being established.

The advantage of individual configuration of the AS-i slaves is that the settings from the configuration are transferred to the IE/AS-i LINK again every time the PROFINET IO controller starts up and that you have documented the configuration of the AS-i slaves in your STEP 7 project. Configuration also means use of less I/O addresses.

- “Diagnostic addr.” tab

  Setting the diagnostic address of the AS-i slave.

Selecting the I/O modules

If you do not want to adopt the default assignment of the IE/AS-i LINK with AS-i placeholder modules, you can replace existing I/O modules by reconfiguring in the properties dialog or can delete selected modules. Extra I/O modules in the configuration do not cause a problem as long as they are configured as placeholder modules (all identifiers set to F_H).

If you want to reinsert a module deleted in the configuration table, take a slave module from the hardware catalog and drag it to the required row.

You will find the slave modules in the following folder in the HW Config catalog:

PROFINET IO > Gateway > IE/AS-i Link PN IO > 6GK1 411-2ABx0 > firmware version V1.0 or V2.0

Note

If you change the name and the order number in the configuration of a slave module, the default name of the slave module will be adopted. To change the name, you will need to open the Properties dialog of the slave module again and change the name.

6.3 Configuration with the GSDML File

Follow the procedure described below if you are using a third-party configuration system or STEP 7 V5.4 / V5.4 SP1.

The following description relates to the STEP 7 V5.4 / V5.4 SP1 user interface. Configuration of the Ethernet ports of the IE/AS-i LINK, the topology, the packing of the address area, the configuration of Siemens slaves and uploading the AS-i configuration to the PG are not supported in these STEP 7 versions.

6.3.1 Installing the GSDML File

Importing the GSD file

1. Open your PROFINET IO project in the SIMATIC Manager.
2. Open “HW Config“.
3. Select the menu command **Options** > **Install GSD File**.
4. In the “Install GSD Files” dialog, click the “Browse” button to select the path and GSDML file you want to install.
5. Select the file in the list and confirm with the “Install” button.
6. Complete installation with the “Close” button.

6.3.2 Configuring the IE/AS-i LINK

Placing the link in the PROFINET IO system

Select the IE/AS-i LINK in the hardware catalog of HW Config with **PROFINET IO** > **Gateway** > **IE/AS-i Link PN IO** and place it in the IO system. At the bottom of the station window, you will see the configuration table with the slots of the IE/AS-i LINK as an IO device. The IE/AS-i LINK is available as double or single master.

Select the link from the relevant subfolder according to the configurations listed in Section 6.1.2.

With a single master, the station window of HW Config displays the row of slot 0 for the AS-i line. With a double master, the rows of slot 0 for AS-i line 1 and slot 100 for AS-i line 2 are occupied. The modules of slot 0 or 100 are the so-called AS-i line proxies. Properties for the specific AS-i line can be set with these modules.

Below slot 0 or 100 for the AS-i lines, the AS-i slave modules are mapped to the following 63 slots. With a single master, these are slots 1...31 and 33...63 (or 101...131 and 133...163 for a double master).

The **slot number** in HW Config corresponds to the **AS-i address**.

The assignments are as follows:

- AS-i line 1
  - Slot 1...31 corresponds to AS-i slave address 1...31 or 1A...31A.
  - Slot 33...63 corresponds to AS-i slave address 1B...31B.
- AS-i line 2
  - Slot 101...131 corresponds to AS-i slave address 1...31 or 1A...31A.
  - Slot 133...163 corresponds to AS-i slave address 1B...31B.

The GSDML file occupies all slots with one digital module 1 byte I/O (1 byte DI / DO). The slave modules have the default configuration $FFFF_H$ so that they already have priority in the AS-i slave settings configured on the IE/AS-i LINK module.

Parameter Assignment for the IE/AS-i LINK

By double-clicking on the IE/AS-i LINK (icon in the PROFINET IO system), you open the properties dialog of the IE/AS-i LINK. Here, you can set the following parameters:

- “General” tab
  Here, you can assign the PROFINET device name and the device number, enable the option “Assign IP address via PROFINET IO Controller” and enter a comment.
- “IO Cycle” tab
  Here, you can change the update time for the IO cycle and the number of update cycles with missing I/O data.

Configuring the Properties of the AS-i Line

To set the address and diagnostic parameters for the AS-i line, double-click on the row of the corresponding line proxies in the configuration table. The Properties dialog of the AS-i line opens. Here, you can make the following entries:

- “General” tab
  Here, you can see the name, Order number and hardware and software version of the module. You can enter a comment in the input box.
- “Addresses” tab
  Here, you can change the diagnostic address.

- “Parameters” tab
  - “Diagnostic interrupt”
    Here, you set the output of various diagnostic interrupts.
    – Line diagnostics (AS-i powerfail, short to ground, I/O error)
    – Configuration diagnostics (extra slave)
    (see Section 9.2.2)
  - “Address programming”
    Here, you can enable or disable automatic or manual address programming for the underlying AS-i line (see also Section 10.1).

6.3.3 Configuring and Assigning Parameters to the AS-i Slaves

Assigning parameters to the AS-i slaves

Select the IE/AS-i LINK in HW Config. Open the Properties dialog of an AS-i slave by double-clicking on the relevant row of the AS-i Slave in the lower station window of HW Config. The Properties dialog has three tabs available in which you can set the following properties:

- “General“ tab
  Here, you can change the name of the module.
- “Addresses“ tab
  Here, you can change the start addresses of the inputs and outputs.
- “Parameter” tab
  Here, you can change the IDs of the I/O modules.
  - I/O Code
  - ID Code, ID1 Code, ID2 Code
    The I/O and ID codes set the type and length of the data for specific slaves.
  - AS-i parameter bits 0 ... 3
    The AS-i parameter bits 0 to 3 have vendor- or slave-specific settings. For more information, refer to the documentation of the relevant AS-i slave device.
    The default setting of the parameter bits is “1”.

As default, the first four IDs (I/O code, ID code, ID1 code, ID2 code) are set to “F_{hex}” in the Properties dialog of the AS-i slaves in the “Parameter” tab. This means the following:

The values already configured on the link are adopted for this AS-i slave. The subsequent parameter bits are then irrelevant in this case. Once again, the values already configured on the link are adopted.

Note

If a value in the configuration data (I/O code, ID code, ID1 code, ID2 code) is not F_{hex}, the configuration data and AS-i parameters stored on the link will be overwritten by the values set here in STEP 7 while the PROFINET IO connection is being established.

Selecting the I/O modules

If you do not use certain AS-i slaves, you can delete the corresponding I/O modules. If you do not want to use the default configuration of the IE/AS-i LINK with Bin.Slave 1 byte I/O modules, you can delete the existing I/O module and replace it with a suitable one from the catalog. You then take an I/O module from the hardware catalog and drag it to the required row.

You will find the slave modules in the HW Config catalog in PROFINET IO > Gateway > IE/AS-i LINK PN IO > Double master or Single master. Various modules for digital or analog values with inputs and/or outputs in sizes between 1 byte and 4 words are available.

For each AS-i slave that occupies more than 4 bits (for example analog slaves), you can reserve I/O address space by selecting a suitable analog module. (For a two-channel analog input slave, for example, the analog module “Ana.Slave 2 words I” is suitable).

To configure the slave modules, open the “Properties Slave” dialog by double-clicking on the row number of the relevant slave module in HW Config. In the “Parameter” tab, you can change the IDs for this slave module (I/O code, ID code, ID 1 code, ID 2 code).

Whether or not the IDs assigned in the properties dialog match the type of the actually connected AS-i slave is not checked by STEP 7.

The advantage of individual configuration of the AS-i slaves is that the settings from the configuration are transferred to the IE/AS-i LINK again every time the PROFINET IO controller starts up and that you have documented the configuration of the AS-i slaves in your STEP 7 project. Configuration also means use of less I/O addresses.

For an overview of the various configuration options, refer to Section 2.2.

❑

7 Data Exchange between PROFINET IO Controller and AS-i Slave

This chapter...

This chapter contains the information you require to access the AS-Interface from the IO controller via the IE/AS-i LINK.

The transfer of the following data is described:

- Digital values and analog values using the cyclic PROFINET IO services
- Analog values and data records using the acyclic PROFINET IO services

Real-time communication (RT) is supported as of version 1 of the IE/AS-i LINK.

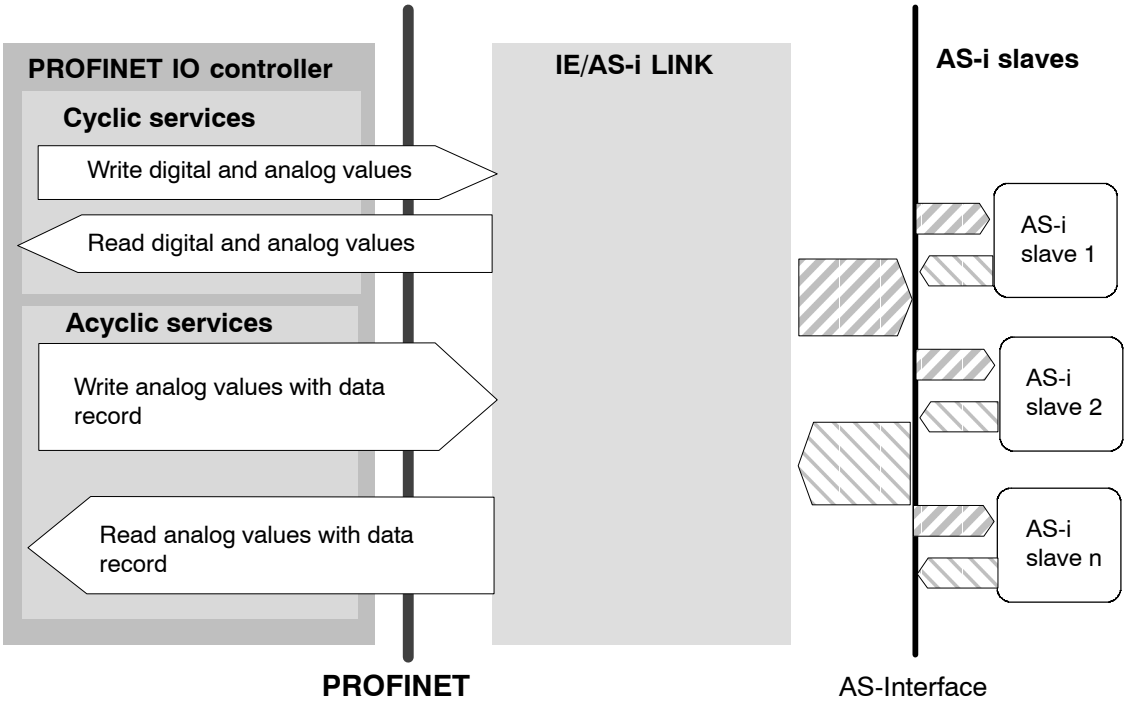
7.1 How the interfaces work

Accessing the AS-Interface from PROFIBUS IO

The PROFINET IO controller communicates with the AS-i slaves over the IE/AS-i LINK. The AS-i communication objects are mapped in one continuous data area for input data and one for output data on the PROFINET IO controller.

The IE/AS-i LINK operates two interfaces:

1. Interface to the PROFINET IO controller: PROFINET IO
2. Interface to the AS-i slaves : AS-Interface



Interface to the PROFINET IO controller: PROFINET IO

At the PROFINET end, the cyclic services and the data record interface of PROFINET IO are used:

- Cyclic services
  The cyclic services are used to transfer digital values and analog values.
- Acyclic services
  Data records are transferred acyclically and are used to read or write analog values and parameters. Diagnostic data and error counters can, for example, also be read. The data record interface is described in Chapter 8.

7.2 Transferring AS-i Digital Values

The PROFINET IO controller accesses the digital inputs and outputs of the AS-i slaves in cyclic mode over the IE/AS-i LINK.

You can only access digital data of an AS-i slave if you have configured a digital module for this slave in HW Config (see Chapter 6).

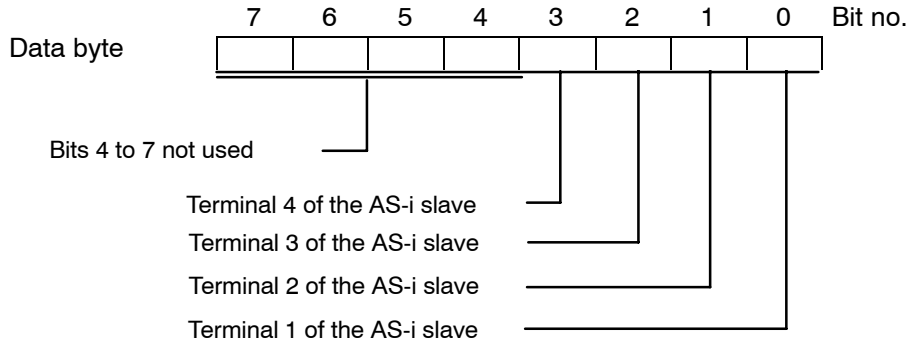
7.2.1 Addressing AS-i Slaves

Access to the bits of the AS-i slave depends on the selected type of configuration.

Access when the GSDML file or STEP 7 is used for configuration (unpacked)

If you configure with the GSDML file or use STEP 7 to configure, access to the digital data without “packing” is byte-oriented.

One byte is assigned to every AS-i digital slave. The assignment of the AS-i terminals AS-i digital slaves to the data bits of the assigned byte is shown below:



Bits 0 to 3 are used for user data.

Digital data is accessed in SIMATIC S7 using single-bit commands.

Example:
A I 3.4
= Q 5.7

Access when you configure with STEP 7 (packed digital data)

If you selected the “Pack” function in the properties dialog of the AS-i line proxy in STEP 7, the digital I/O data of all AS-i slaves will be transferred tightly packed in the data field of the line proxy. The bit address of the AS-i bits is calculated and displayed by STEP 7.

If a configured AS-i slave fails during runtime, this is signaled to the user program as a remove module alarm via the diagnostic address assigned to the slave. When accessing the digital bits of the AS-i slave, there is, however, no I/O error.

7.2.2 Special Feature of AS-i Analog Slaves

If you use slaves complying with CTT 1−5, the I/O bits may be used for special transfer functions. For more detailed information, refer to the documentation of the relevant AS-i slave.

The following applies to these protocol bits:

- In the input direction, the IE/AS-i LINK sets the value “0”.
- In the output direction, the IE/AS-i LINK ignores the bits.

How to access AS-i analog slaves is described in Section 7.3.

7.2.3 Special Features of AS-i Safety Slaves

IE/AS-i LINK sets the input bits at the safe input (F−IN1 or F−IN2):

- 0 and 1 = 0 if the contact at F−IN1 is open;
- 0 and 1 = 1 if the contact at F−IN1 is closed;
- 2 and 3 = 0 if the contact at F−IN2 is open;
- 2 and 3 = 1 if the contact at F−IN2 is closed;

7.3 Transferring AS-i Analog Values

You can only access analog data of an AS-i slave using cyclic services if you have configured an analog module for this slave in HW Config (see Chapter 6).

Notice

The following listings apply only to AS-i slaves that handle analog value transfer according to the 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 1–5 according to AS-i Specification V3.0).

Analog value transfer according to the obsolete AS-i slave profile 7.1 and /7.2 is not supported by the IE/AS-i LINK. In this case, the analog value transfer must be implemented by the user program.

Analog data is accessed in SIMATIC S7 using word commands.

Example:
If you have configured a module “Ana.Slave 2 words AI” with I/O address 256 for a slave, you can access the second analog channel of the slave with the STEP 7 command “L PIW 258”.

If you have configured a module “Ana.Slave 1 word Q” with I/O address 260 for an A or B slave, you can access the first analog channel of the slave with the STEP 7 command “T PQW 260”.

Table 7-1 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

Representation of the analog values or transparent values

The analog values are interpreted as 16-bit values in two's complement.

The transparent values are interpreted as two independent bytes.

For further information regarding the range of values, the measurement range and the accuracy please refer to the relevant documentation of the analog slaves.

7.3.1 Accessing AS-i Analog Data using Acyclic Services

PROFINET IO controller with acyclic services

As alternative to cyclic data transfer, the acyclic services of PROFINET IO allow special jobs to be used for sending output data to the IO devices or receiving input data of the IO devices.

The acyclic services are used on the IE/AS-i LINK for the data record interface (see Chapter 8).

Access to analog data using acyclic services can be selected, for example to save I/O address space on the SIMATIC S7.

In the default configuration of the IE/AS-i LINK in STEP 7 with only digital slaves, it is possible to access the analog data of the slaves with the data record interface if the configuration identifiers (I/O configuration, ID code, ID 1 code, ID 2 code) are left with their default setting (F_H).

Notice

Simultaneous writes to analog data of a slave either using cyclic services, in other words via configured analog modules or using acyclic services (data records) is not permitted.

7.3.2 Special Situations in Analog Value Transfer

- In the input direction, the AS-i master sends a substitute value if a slave fails or if there is a problem in AS-i communication:
  - With analog slaves complying with the following profiles, the AS-i master supplies "$0x7FFF_H$" as the 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 and 7.5.5 and B.A.5 (if you have analog input)
  - With analog slaves complying with the following profiles, the AS-i master supplies "$0x0000_H$" as the 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 you have transparent input)
  - With all other analog slaves, the assigned analog value is "$0x7FFF_H$".
- In the output direction, the AS-i master send logic "0" to all slaves if there is a failure or if the PLC of the controller station changes to STOP.

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8 Using the Data Record Interface

This chapter...

This chapter contains the information you require to access the data record interface of the IE/AS-i LINK from the PROFINET IO controller.

8.1 Data Record Interface of the IE/AS-i LINK

Significance and Functionality

Using the data record interface, you can control the response of the AS-i master completely from your user program.

AS-i calls are read and written using the acyclic services of PROFINET IO. You can do this in the user program of the PROFINET IO controllers with the “RecordDataRead” (read data record) and “RecordDataWrite” (write data record) services.

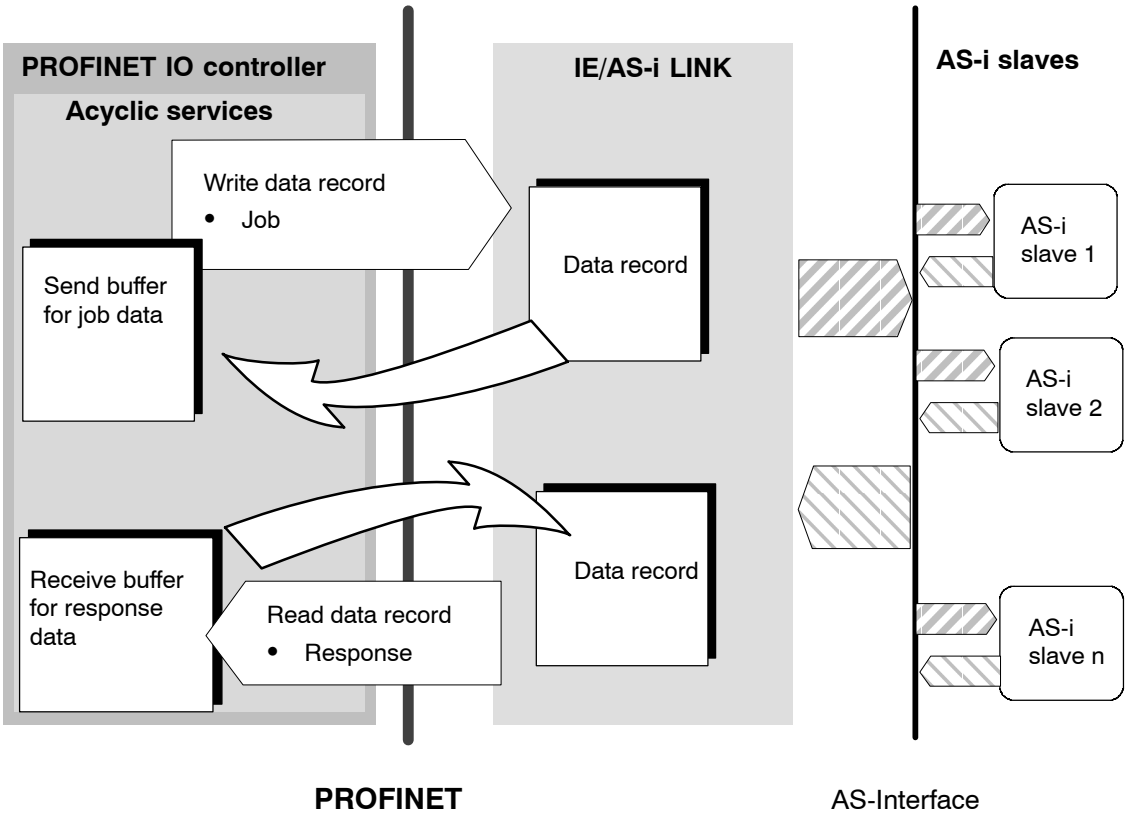

Figure 8-1

Calls

The following blocks are used for read or write data record:

Table 8-1

Call	With SIMATIC S7	With IO-Base programming interface
Read data record (RecordDataRead)	SFB52	pnio_rec_read_rec()
Write data record (RecordDataWrite)	SFB53	pnio_rec_write_rec()

Call Parameters

Certain parameters must have values assigned to specify the job. The name of this parameter and type of parameter assignment can vary depending on the type of PROFINET IO controller (user program for S7-CPU or for PG/PC).

Table 8-2 Parameters for Read/Write Data Records

SIMATIC S7 (SFB 52/53)	For PC: IO-Base programming interface (pnio_*_read/write)
ID: I/O address or diagnostic address of the required slot of the IE/AS-i LINK. • Call to an AS-i line: Here, you specify the I/O address or the diagnostic address of the required line (slot 0 or 100) as a HEX value. • Call to an AS-slave: Here, you specify the I/O address or diagnostic address of the required AS-i slave (slot 1...63 or 101...163) as a HEX value.	pAddr: Address of the required slot of the IE/AS-i LINK. • Call to an AS-i line: Here, you specify the address of the required line (slot 0 or 100) as a HEX value. • Call to an AS-slave: Here, you specify the address of the required AS-i slave (slot 1...63 or 101...163) as a HEX value.
Index: Data record number, data format: INT	RecordIndex
MLEN: length for “read data record” LEN: length for “write data record”	Length
RECORD: Destination area for the data record, referenced by ANY pointer	Return over callback event

Job parameters

Set the parameters for the “read data record” and “write data record” jobs as described above. Access is controlled by the following parameters:

- ”Index”
  Specifies the data record number.
- ”Length”
  Specifies the length of the input/output data area; the specified length must be adapted to the data record being used.
  - The length of the data sent (with write data record) is specified depending on the call.
    Make sure that you select an adequately large buffer. The buffer may be larger than the number of bytes used.
- “Data”
  Specifies the address of the send/receive buffer in the user program.

Return value

The return values of the AS-i LINK can be evaluated by the user program in SIMATIC S7 with the system function block SFB52 or SFB53. SFB52 or SFB53 returns a double word in which the output parameter “STATUS” contains the error information:

For information on SFB52/53, refer to the block helps of STEP 7.

- STATUS[1] Read: “DE”$_H$
  Write: “DF”$_H$
- STATUS[2]: “80”$_H$
- STATUS[3] Read: “A0”$_H$
  Write: “A1”$_H$
- STATUS[4]: see Table 8-3.

Device-specific errors of the link for the “Status” return value

Table 8-3 Error Detection in “STATUS[4]” of the Return Value of the IE/AS-i LINK

STATUS[4]	Meaning
01_H	Invalid CTT2 index
02_H	Invalid CTT2 length
04_H	CTT2 slave is temporarily busy.
05_H	The addressed AS-i slave was not found on the AS-Interface.
06_H	An AS-i slave with address 0 exists.
07_H	An AS-i slave with the new address already exists on the AS-Interface.
08_H	The AS-i slave address cannot be deleted.
09_H	Error reading the extended ID1 code
$0A_H$	The AS-i slave address cannot be set.
$0B_H$	The AS-i slave address cannot be stored permanently.
21_H	The AS-i slave address is incorrect
22_H	The AS-i slave is not activated (not in LAS).
23_H	Error on the AS-Interface
24_H	The call not permitted in the current status of the AS-i master.
25_H	An AS-i slave with address 0 exists.
26_H	The AS-i slave has illegal configuration data (I/O or ID codes).
27_H	The target address is not plausible (for example a B slave address was used for a standard slave).
$2E_H$	The job number or the job parameter is unknown.
$2F_H$	The AS-i master has detected an EEPROM error.
31_H	A length error has occurred transferring a string.
32_H	A protocol error has occurred transferring a string.
33_H	CTT2 slave not initialized.
FF_H	Error not specified in greater detail

You will find other, general error IDs in the Help on SFB54.

8.2 Description of the AS-i Line and AS-i Slave Calls

Overview

This section describes the calls that can be sent by the PROFINET IO controller to the IE/AS-i LINK. With these calls, the IE/AS-i LINK provides the complete functionality of the master profile M4 of the AS-i master specification. The IE/AS-i LINK can be configured completely by the PROFINET IO controller using calls.

Which calls can be executed can be found in the following two tables:

- Table 8-4 lists the calls for the “AS-i line” level.
- Table 8-5 lists the calls for the “AS-i Slave” level.
- Table 8-6 contains the calls for the “AS-i slave” level that are supported only by slaves complying with AS-i specification V3.0 (CTT slaves).

The IE/AS-i LINK also supports calls with indexes higher than 0x8000 (decimal 32768), as described in the PROFINET specification IEC 61158.

Table 8-4 AS-i Line Calls

Name	Function	Index (decimal)	Data in the send or receive buffer	Description
Store_Actual_Parameters	Write	7	–	Section 8.2.1.1
Store_Actual_Configuration	Write	10	–	Section 8.2.1.2
Set_LPS	Write	12	LPS	Section 8.2.1.3
Get_LPS_LAS_LDS_LPF_Flags	Read	84	LPS, LAS, LDS, LPF, flags	Section 8.2.1.4
Get_LAS_CDI_PI_Flags	Read	85	Entire configuration (LAS, CDI, parameters), flags	Section 8.2.1.5
Set_LPS_PCD_PP_Flags	Write	86	Entire configuration (LPS, PCD, parameters), flags	Section 8.2.1.6
Set_Operation_Mode	Write	17	Mode	Section 8.2.1.7
Set_Offline_Mode	Write	18	Mode	Section 8.2.1.8
Change_Slave_Address	Write	20	Slave addresses	Section 8.2.1.9
Set_Auto_Addr_Enable	Write	21	Mode	Section 8.2.1.10
Write_Extended_ID-Code_1	Write	24	ID1 code	Section 8.2.1.11
Read_AIDI	Read	25	Analog input data	Section 8.2.1.12
Write_AODI	Write	26	Analog output data	Section 8.2.1.13
Read_AS-i_Line_Errorcounters	Read	96	Error counters	Section 8.2.1.14
Read_and_delete_AS-i_Line_Errorcounters	Read	97	Error counters	Section 8.2.1.15

Table 8-5 AS-i Slave Calls

Name	Function	Index (decimal)	Data in the send / receive buffer	Description
Set_Permanent_Parameter	Write	3	Parameter value	Section 8.2.2.1
Get_Permanent_Parameter	Read	4	Parameter value	Section 8.2.2.2
Write_Parameter	Write	5	Parameter value	Section 8.2.2.3
Read_Parameter	Read	6	Parameter value	Section 8.2.2.4
Set_Permanent_Configuration	Write	8	Configuration	Section 8.2.2.5
Get_Permanent_Configuration	Read	9	Configuration	Section 8.2.2.6
Read_Actual_Configuration	Read	11	Configuration	Section 8.2.2.7
Read_I/O_Configuration	Read	33	I/O configuration	Section8.2.2.14
Read_ID-Code	Read	34	ID code	Section 8.2.2.15
Read_Extended_ID-Code_1	Read	24	ID1 code	Section 8.2.2.16
Read_Extended_ID−Code_2	Read	35	ID2 code	Section 8.2.2.17
Read_Status	Read	80	Status of the AS-i slave (error flags)	Section 8.2.2.18
Get_Write_Parameter_Echo	Read	81	Parameter echo value	Section 8.2.2.19
Write_Analog_Output_Data	Write	82	Analog output data of the AS-i slave	Section 8.2.2.20
Read_Analog_Output_Data	Read	83	Analog input data of the AS-i slave	Section 8.2.2.21
Read_AS-i_Slave_Errorcounters	Read	98	Error counters	Section 8.2.2.22
Read_and_delete_AS-i_Slave_Errorcoun−ters	Read	99	Error counters	Section 8.2.2.23

Table 8-6 AS-i Slave Calls for Slaves Complying with AS-i Specification V3.0 (CTT1, CTT2)

Name	Function	Index (decimal)	Data in the send / receive buffer	Description
Read_Parameter_String	Read	27	Parameter string	Section 8.2.2.8
Write_Parameter_String	Write	28	Parameter string	Section 8.2.2.9
Read_Diagnostic_String	Read	29	Diagnostic string	Section 8.2.2.10
Read_Identification_String	Read	30	ID string	Section 8.2.2.11
Write_CTT2_String	Write	31	CTT2 string	Section 8.2.2.12
Read_CTT2_String	Read	31	CTT2 string	Section 8.2.2.13

8.2.1 AS-i Line Calls

8.2.1.1 Store_Actual_Parameters

Meaning

This call writes the current parameters of the AS-i slaves from the volatile memory of the AS-i master to its retentive memory. If the C-PLUG is inserted, the data is written only to the C-PLUG. Existing value are overwritten, in other words, the parameters of all AS-i slaves are configured.

In the factory setting, the bits of the AS-i slave parameters on the AS-i master all have the value 1.

The RecordDataWrite service – **index 7** does not contain any user data.

For information on “parameters” and the IDs of the “Configuration” (I/O configuration, ID code, ID1 code and ID2 code) /5/.

Exceptions

There are some AS-i slave types with which the AS-i master itself manages the slave parameter assignment. The configured parameters for these AS-i slaves are always the same F_H.

8.2.1.2 Store_Actual_Configuration

Meaning

With this call, the (actual) configuration data (I/O configuration, ID code, ID1 code and ID2 code) of all AS-i slaves is stored permanently in the EEPROM (or in the C-PLUG if it is inserted) as the (expected) configuration data. The list of activated AS-i slaves (LAS) is adopted in the list of permanent AS-i slaves (LPS).

When this call is executed, the AS-i master changes to the offline phase and then changes back to the normal mode (warm restart on the AS-i master).

This call is not made in the protected mode.

Note

If you use CPUs from the SIMATIC S7 system as the PROFINET IO controller, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the IE/AS-i LINK during startup. Use of the call described here is then generally unnecessary.

The RecordDataWrite service – **index 10** does not contain any user data.

For information on “parameters” and the IDs of the “Configuration” (I/O configuration, ID code, ID1 code and ID2 code) /5/.

8.2.1.3 Set_LPS

Meaning

This call transfers the list of configured AS-i slaves for non-volatile storage in the EEPROM of the master or in the C-PLUG, if it is inserted. When this call is executed, the AS-i master changes to the offline phase and then changes back to the normal mode (warm restart on the AS-i master).
The call is not executed in protected mode.

Note

If you use CPUs from the SIMATIC S7 system as the PROFINET IO controller, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the IE/AS-i LINK during startup. Use of the call described here is then generally unnecessary.

Structure of the RecordDataWrite service – Index 12

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Slave 7/7A	Slave 6/6A	Slave 5/5A	Slave 4/4A	Slave 3/3A	Slave 2/2A	Slave 1/1A	Slave 0/0A
3	Slave 15/15A	Slave 14/14A	Slave 13/13A	Slave 12/12A	Slave 11/11A	Slave 10/10A	Slave 9/9A	Slave 8/8A
4	Slave 23/23A	Slave 22/22A	Slave 21/21A	Slave 20/20A	Slave 19/19A	Slave 18/18A	Slave 17/17A	Slave 16/16A
5	Slave 31/31A	Slave 30/30A	Slave 29/29A	Slave 28/28A	Slave 27/27A	Slave 26/26A	Slave 25/25A	Slave 24/24A
6	Slave 7B	Slave 6B	Slave 5B	Slave 4B	Slave 3B	Slave 2B	Slave 1B	Slave 0B
7	Slave 15B	Slave 14B	Slave 13B	Slave 12B	Slave 11B	Slave 10B	Slave 9B	Slave 8B
8	Slave 23B	Slave 22B	Slave 21B	Slave 20B	Slave 19B	Slave 18B	Slave 17B	Slave 16B
9	Slave 31B	Slave 30B	Slave 29B	Slave 28B	Slave 27B	Slave 26B	Slave 25B	Slave 24B
10	Reserved 0x0000							
11								

The bits in the LPS data have the following meaning: *0* = AS-i slave not configured; *1* = AS-i slave configured.

8.2.1.4 Get_LPS_LAS_LDS_LPF_Flags

Meaning

With this call, the following entries are read out of the IE/AS-i LINK:

- The list of permanent AS-i slaves (LPS)
- The list of activated AS-i slaves (LAS)
- The list of detected AS-i slaves (LDS)
- The list of existing I/O errors of the activated AS-i slaves LPF
- Flags according to the AS-i slave specification

Structure of the response data of the RecordDataRead service – Index 84

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	LAS slave 7/7A	LAS slave 6/6A	LAS slave 5/5A	LAS slave 4/4A	LAS slave 3/3A	LAS slave 2/2A	LAS slave 1/1A	LAS Slave 0/0A
3	LAS slave 15/15A	LAS slave 14/14A	LAS slave 13/13A	LAS slave 12/12A	LAS slave 11/11A	LAS slave 10/10A	LAS slave 9/9A	LAS slave 8/8A
4	LAS slave 23/23A	LAS slave 22/22A	LAS slave 21/21A	LAS slave 20/20A	LAS slave 19/19A	LAS slave 18/18A	LAS slave 17/17A	LAS slave 16/16A
5	LAS slave 31/31A	LAS slave 30/30A	LAS slave 29/29A	LAS slave 28/28A	LAS slave 27/27A	LAS slave 26/26A	LAS slave 25/25A	LAS slave 24/24A
6	LAS slave 7B	LAS slave 6B	LAS slave 5B	LAS slave 4B	LAS slave 3B	LAS slave 2B	LAS slave 1B	LAS slave 0B
7	LAS slave 15B	LAS slave 14B	LAS slave 13B	LAS slave 12B	LAS slave 11B	LAS slave 10B	LAS slave 9B	LAS slave 8B
8	LAS slave 23B	LAS slave 22B	LAS slave 21B	LAS slave 20B	LAS slave 19B	LAS slave 18B	LAS slave 17B	LAS slave 16B
9	LAS slave 31B	LAS slave 30B	LAS slave 29B	LAS slave 28B	LAS slave 27B	LAS slave 26B	LAS slave 25B	LAS slave 24B
10	LDS slave 7/7A	LDS slave 6/6A	LDS slave 5/5A	LDS slave 4/4A	LDS slave 3/3A	LDS slave 2/2A	LDS slave 1/1A	LDS Slave 0/0A
11	LDS slave 15/15A	LDS slave 14/14A	LDS slave 13/13A	LDS slave 12/12A	LDS slave 11/11A	LDS slave 10/10A	LDS slave 9/9A	LDS slave 8/8A
12	LDS slave 23/23A	LDS slave 22/22A	LDS slave 21/21A	LDS slave 20/20A	LDS slave 19/19A	LDS slave 18/18A	LDS slave 17/17A	LDS slave 16/16A
13	LDS slave 31/31A	LDS slave 30/30A	LDS slave 29/29A	LDS slave 28/28A	LDS slave 27/27A	LDS slave 26/26A	LDS slave 25/25A	LDS lave 24/24A

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

Meaning of the Bits in Bytes 0 to 33

- Bit = 0 :
  LAS (bytes 2 to 9): The AS-i slave is not activated
  LDS (bytes 10 to 17): The AS-i slave was not detected
  LPS (bytes 18 to 25): The AS-i slave is not configured
  LPF (bytes 26 to 33): The AS-i slave is not signaling a peripheral fault
- Bit = 1:
  LAS (bytes 2 to 9): The AS-i slave is activated
  LDS (bytes 10 to 17): The AS-i slave was detected
  LPS (bytes 18 to 25): The AS-i slave is configured
  LPF (bytes 26 to 33): The AS-i slave is signaling a peripheral fault

Flag 1

Bit	Meaning
0	CONFIG_OK
1	LDS_0
2	AUTO_ADDR_ASSIGN
3	AUTO_ADDR_AVAIL
4	CONFIG_MODE
5	NORMAL_MODE
6	APF
7	OFFLINE_READY

Flag 2

Bit	Meaning
0	PERIPHERY_OK
1	DATA_EXCHANGE_ACTIVE
2	OFFLINE
3	AUTO_ADDR_ENABLE
4	Ground short
5	EPROM_OK
6	reserved
7	reserved

Meaning of the Flags

Flag	Meaning
CONFIG_OK	This flag is set when the desired (configured) and actual configuration match.
LDS_0	This flag is set when an AS-i slave exists with address 0.
AUTO_ADDR_ASSIGN	This flag is set when the automatic address programming is possible (in other words, SET_AUTO_ADDR_ENABLE = 1 **and** there is no “incorrect” slave connected to the AS-i Interface).
AUTO_ADDR_AVAIL	This flag is set when the automatic address programming can be executed (in other words, exactly **one** AS-i slave is currently out of operation).
CONFIG_MODE	The flag is set in the configuration mode and reset in the protected mode.
NORMAL_MODE	This flag is set when the IE/AS-i LINK is in the normal mode. (The flag is set when the link is in normal mode)
APF	This flag is set when the voltage on the AS-i cable is too low.
OFFLINE_READY	The flag is set when the offline phase is active.
PERIPHERY_OK	This flag is set when at no AS-i slave is signaling a peripheral fault.
DATA_EXCHANGE_ACTIVE	The “DATA_EXCHANGE_ACTIVE” flag is set when data is being exchanged in normal mode.

Flag	Meaning
OFFLINE	This flag is set when the mode is to changed to OFFLINE or this mode has already been adopted.
AUTO_ADDR_ENABLE	This flag indicates whether the automatic address programming is enabled (BIT = 1) or disabled (BIT = 0) by the user.
Ground short	The flag is set when there is a short to ground on the AS-i cable.
EPROM_OK	This flag is set when the EEPROM of the device is OK.

8.2.1.5 Get_LAS_CDI_PI_Flags

Meaning

With this call, the following data is read out of IE/AS-i LINK:

- The list of active AS-i slaves (LAS) This indicates which of the connected AS-i slaves are activated.
- The current configuration data of the connected AS-i slaves (I/O configuration, ID code, ID1 code, ID2 code);
- The current parameters of the AS-i slaves (actual parameters)
- The current flags.

This call can, for example, be used to find out the configuration of the stations connected to the AS-i cable after installation. The configuration data read in can, if necessary, be changed and saved as the desired configuration on the IE/AS-i LINK with the 'Set_LPS_PCD_PP_Flags' call (see Section 8.2.1.6).

Structure of the response data of the RecordDataRead service – Index 85

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	LAS slave 7/7A	LAS slave 6/6A	LAS slave 5/5A	LAS slave 4/4A	LAS slave 3/3A	LAS slave 2/2A	LAS slave 1/1A	LAS Slave 0/0A
3	LAS slave 15/15A	LAS slave 14/14A	LAS slave 13/13A	LAS slave 12/12A	LAS slave 11/11A	LAS slave 10/10A	LAS slave 9/9A	LAS slave 8/8A
4	LAS slave 23/23A	LAS slave 22/22A	LAS slave 21/21A	LAS slave 20/20A	LAS slave 19/19A	LAS slave 18/18A	LAS slave 17/17A	LAS slave 16/16A
5	LAS slave 31/31A	LAS slave 30/30A	LAS slave 29/29A	LAS slave 28/28A	LAS slave 27/27A	LAS slave 26/26A	LAS slave 25/25A	LAS slave 24/24A
6	LAS slave 7B	LAS slave 6B	LAS slave 5B	LAS slave 4B	LAS slave 3B	LAS slave 2B	LAS slave 1B	LAS slave 0B
7	LAS slave 15B	LAS slave 14B	LAS slave 13B	LAS slave 12B	LAS slave 11B	LAS slave 10B	LAS slave 9B	LAS slave 8B
8	LAS slave 23B	LAS slave 22B	LAS slave 21B	LAS slave 20B	LAS slave 19B	LAS slave 18B	LAS slave 17B	LAS slave 16B
9	LAS slave 31B	LAS slave 30B	LAS slave 29B	LAS slave 28B	LAS slave 27B	LAS slave 26B	LAS slave 25B	LAS slave 24B
10	I/O configuration slave 0				ID_CODE slave 0			
11	ID1_Code slave 0				ID2_Code slave 0			
12	I/O configuration slave 1				ID_CODE slave 1			

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
13	ID1_Code slave 1				ID2_Code slave 1			
...								
72	I/O configuration slave 31				ID_CODE slave 31			
73	ID1_Code slave 31				ID2_Code slave 31			
74	Reserved 0x0000							
75								
76	I/O configuration slave 1B				ID_CODE slave 1B			
77	ID1_Code slave 1B				ID2_Code slave 1B			
78	I/O configuration slave 2B				ID_CODE slave 2B			
79	ID1_Code slave 2B				ID2_Code slave 2B			
...								
136	I/O configuration slave 31B				ID_CODE slave 31B			
137	ID1_Code slave 31B				ID2_Code slave 31B			
138	Reserved 0x00				Parameter slave 1/1A			
139	Parameter 2/2A				Parameter 3/3A			
	P3	P2	P1	P0	P3	P2	P1	P0
...								
153	Parameter 30/30A				Parameter 31/31A			
	P3	P2	P1	P0	P3	P2	P1	P0
154	Reserved 0x00				Parameter slave 1/1B			
					P3	P2	P1	P0
155	Parameter 2/2B				Parameter 3/3B			
	P3	P2	P1	P0	P3	P2	P1	P0
...								
169	Parameter 30/30B				Parameter 31/31B			
	P3	P2	P1	P0	P3	P2	P1	P0
170	Flag 1							
171	Flag 2							

Flag 1

Bit Number	Meaning
0	CONFIG_OK
1	LDS_0
2	AUTO_ADDR_ASSIGN
3	AUTO_ADDR_AVAIL
4	CONFIG_MODE
5	NORMAL_MODE
6	APF
7	OFFLINE_READY

Flag 2

Bit Number	Meaning
0	PERIPHERY_OK
1	DATA_EXCHANGE_ACTIVE
2	OFFLINE
3	AUTO_ADDR_ENABLE
4	Ground short
5	EPROM_OK
6	reserved
7	reserved

The meaning of the flags is the same as in the “Get_LPS_LAS_LDS_LPF_Flags” job, Section 8.2.1.4).

8.2.1.6 Set_LPS_PCD_PP_Flags

Meaning

With this call, the required total configuration of the AS interface is transferred to the AS-i master and stored permanently in the EEPROM (and on the C-PLUG if inserted) as the expected configuration. This configures the IE/AS-i LINK.
The following data are transferred:

- The list of configured AS-i slaves specifying the AS-i slaves that can be activated by the AS-i master in the protected mode.
- The list of configuration data specifying the ID codes and I/O configurations the AS-i slaves must have.
- The list of AS-i slave parameters configured on 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 status of the AS-i master following start up.

Note

If you use CPUs from the SIMATIC S7 system as the PROFINET IO controller, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the IE/AS-i LINK during startup. Use of the call described here is then generally unnecessary.

Exceptions

There are some AS-i slave types with which the AS-i master itself manages the slave parameter assignment. The configured parameters for these AS-i slaves are always the same F_H. The parameter values specified in the call are ignored by the AS-i master for these slave types.

Structure of the RecordDataWrite service – Index 86

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	LPS slave 7/7A	LPS slave 6/6A	LPS slave 5/5A	LPS slave 4/4A	LPS slave 3/3A	LPS slave 2/2A	LPS slave 1/1A	LPS Slave 0/0A
3	LPS slave 15/15A	LPS slave 14/14A	LPS slave 13/13A	LPS slave 12/12A	LPS slave 11/11A	LPS slave 10/10A	LPS slave 9/9A	LPS slave 8/8A

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	LPS slave 23/23A	LPS slave 22/22A	LPS slave 21/21A	LPS slave 20/20A	LPS slave 19/19A	LPS slave 18/18A	LPS slave 17/17A	LPS slave 16/16A
5	LPS slave 31/31A	LPS slave 30/30A	LPS slave 29/29A	LPS slave 28/28A	LPS slave 27/27A	LPS slave 26/26A	LPS slave 25/25A	LPS slave 24/24A
6	LPS slave 7B	LPS slave 6B	LPS slave 5B	LPS slave 4B	LPS slave 3B	LPS slave 2B	LPS slave 1B	LPS slave 0B
7	LPS slave 15B	LPS slave 14B	LPS slave 13B	LPS slave 12B	LPS slave 11B	LPS slave 10B	LPS slave 9B	LPS slave 8B
8	LPS slave 23B	LPS slave 22B	LPS slave 21B	LPS slave 20B	LPS slave 19B	LPS slave 18B	LPS slave 17B	LPS slave 16B
9	LPS slave 31B	LPS slave 30B	LPS slave 29B	LPS slave 28B	LPS slave 27B	LPS slave 26B	LPS slave 25B	LPS slave 24B
10	I/O configuration slave 0				ID_CODE slave 0			
11	ID1_Code slave 0				ID2_Code slave 0			
12	I/O configuration slave 1				ID_CODE slave 1			
13	ID1_Code slave 1				ID2_Code slave 1			
...								
72	I/O configuration slave 31				ID_CODE slave 31			
73	ID1_Code slave 31				ID2_Code slave 31			
74	Reserved 0x0000							
75								
76	I/O configuration slave 1B				ID_CODE slave 1B			
77	ID1_Code slave 1B				ID2_Code slave 1B			
78	I/O configuration slave 2B				ID_CODE slave 2B			
79	ID1_Code slave 2B				ID2_Code slave 2B			
...								
136	I/O configuration slave 31B				ID_CODE slave 31B			
137	ID1_Code slave 31B				ID2_Code slave 31B			
138	Reserved 0x00				Parameter slave 1/1A			
					P3	P2	P1	P0
139	Parameter 2/2A				Parameter 3/3A			
	P3	P2	P1	P0	P3	P2	P1	P0
...								
153	Parameter 30/30A				Parameter 31/31A			
	P3	P2	P1	P0	P3	P2	P1	P0
154	Reserved 0x00				Parameter slave 1/1B			
					P3	P2	P1	P0
155	Parameter 2/2B				Parameter 3/3B			
	P3	P2	P1	P0	P3	P2	P1	P0
...								

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
169	Parameter 30/30B				Parameter 31/31B			
	P3	P2	P1	P0	P3	P2	P1	P0
170	Flag 1							
171	Flag 2							

Flag 1

Bit Number	Meaning
0	CONFIG_OK
1	LDS_0
2	AUTO_ADDR_ASSIGN
3	AUTO_ADDR_AVAIL
4	CONFIG_MODE
5	NORMAL_MODE
6	APF
7	OFFLINE_READY

Flag 2

Bit Number	Meaning
0	PERIPHERY_OK
1	DATA_EXCHANGE_ACTIVE
2	OFFLINE
3	AUTO_ADDR_ENABLE
4	Ground short
5	EPROM_OK
6	reserved
7	reserved

In the table, the rows of the flags whose values change the mode of the AS-i master (CONFIG_MODE, AUTO_ADDR_ENABLE) are shown in white.

The values of the other flags (gray in the table) have no significance for the 'Set_LPS_PCD_PP_Flags' call and cannot be modified on the AS-i master with this call..

The meaning of the flags is the same as in the "Get_LPS_LAS_LDS_LPF_Flags" job, Section 8.2.1.4).

8.2.1.7 Set_Operation_Mode

Meaning

This call changes the module between the “configuration mode” and the “protected mode”.

In the protected mode, only AS-i slaves are activated that are entered in the LPS and whose expected and actual configurations match, in other words, when the I/O configuration and ID codes of the detected AS-i slaves are identical to the configured values.

In the configuration mode, all detected AS-i slaves (except for AS-i slave ”0”) are activated. AS-i slaves in which there are differences between the expected and actual configuration are also activated.

The “OPERATION MODE” bit is stored permanently; in other words, it is retained following a cold/warm restart.

The following bit assignment applies to the operating mode:

- Protected mode: “0”
- Configuration mode: “1”

When you change from the configuration mode to the protected mode, there is a warm restart on the AS-i master (change to the offline phase followed by a change to the online mode).

Notice

If an AS-i slave with address 0 is entered in the LDS, the IE/AS-i LINK cannot change from the configuration mode to the protected mode.

Structure of the RecordDataWrite service – Index 17

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0	0	0	0	0	0	0	Mode
3	Reserved 0x00							

8.2.1.8 Set_Offline_Mode

Meaning

This call switches between the online and offline mode.

Online mode

The online mode is the normal operating situation for the AS-i master. Here, the following jobs are processed cyclically:

- During the “data exchange phase”, the fields of the output data are transferred to the slave outputs for all activated AS-i slaves. The addressed AS-i slaves transfer the values of the slave inputs to the master when the transfer was free of errors.
- This is followed by the “inclusion phase” in which there is a search for the existing AS-i slaves and newly added AS-i slaves are entered in the LDS or LAS.
- In the “management phase”, jobs from the user such as writing parameters are executed.

Offline mode

In offline mode, the IE/AS-i LINK only processes jobs from the user (jobs that bring about an immediate response on an AS-i slave are rejected as errors). There is no cyclic data exchange with the AS-i slaves.

Bit assignment

The following bit assignment applies to the online/offline mode:

- Online mode: “0”
- Offline mode: “1”

The OFFLINE=TRUE bit is not permanently stored; in other words, following a cold/warm restart, the IE/AS-i LINK is once again in online mode.

Structure of the RecordDataWrite service – Index 18

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0	0	0	0	0	0	0	Mode
3	Reserved 0x00							

8.2.1.9 Change_Slave_Address

Meaning

With this call, the AS-i address of an AS-i slave can be modified.

This call is mainly used to add a new AS-i slave with the default address “0” to the AS-Interface. In this case, the address is changed from “AS-i slave address old” (=0) to “AS-i slave address new”.

This change can only be made when the following conditions are fulfilled:

1. An AS-i slave with “AS-i slave address old” exists.
2. If the old AS-i slave address is not equal to 0, then no other AS-i slave with address 0 can be connected at the same time.
3. The “AS-i slave address new” must have a valid value.
4. An AS-i slave with “AS-i slave address new” must not exist.

Structure of the RecordDataWrite service – Index 20

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	AS-i address old							
3	AS-i address new							

8.2.1.10 Set_Auto_Addr_Enable

Meaning

Using this call, the “Set_Auto_Addr_Enable” function of the AS-i slaves of a line is enabled or disabled (See also Section 10.1).

- Mode = 0: Set_Auto_Addr_Enable disabled
- Mode = 1: Set_Auto_Addr_Enable enabled

The *Set_Auto_Addr_Enable* bit is stored permanently; in other words, it is retained after a warm/hot restart on the AS-i master.

Structure of the RecordDataWrite service – Index 21

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0	0	0	0	0	0	0	Mode
3	Reserved 0x00							

8.2.1.11 Write_Extended_ID–Code_1

Meaning

With this call, the extended ID1 code of an AS-i slave with address “0” can be written directly over the AS-i cable.

The AS-i master passes on the extended ID1 code to the AS-i slave without any plausibility check. The ID1 code is stored permanently on the AS-i slave. The ID1 code is stored temporarily on the AS-i master in CDI (RAM).

Structure of the RecordDataWrite service – Index 24

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				ID1 code			
3	Reserved 0x00				Mode			

8.2.1.12 Read_AIDI

Meaning

This call reads the process image of the analog input data of the AS-i line of an AS-i master.

Structure of the RecordDataRead service – Index 25

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Slave 1, channel 1 or slave 1A, channel 1							
3								
4	Slave 1, channel 2 or slave 1A, channel 2							
5								
6	Slave 1, channel 3 or slave 1B, channel 3							
7								
8	Slave 1, channel 4 or slave 1B, channel 4							
9								
...								
...								
242	Slave 31, channel 1 or slave 31A, channel 1							
243								
244	Slave 31, channel 2 or slave 31A, channel 2							
245								
246	Slave 31, channel 3 or slave 31B, channel 3							
247								
248	Slave 31, channel 4 or slave 31B, channel 4							
249								

Mapping of the analog values in the data record when accessing the entire line

You can use analog value access with the entire AS-i line to save I/O address space in the S7 station.

An 8-byte area is used for each slave address to manage 4 analog channels. Table 8-7 below shows which address area in the data record the analog values of which AS-i slave are transferred to.

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

Table 8-7 Access to Analog Values of an AS-i Line using Data Records

AS-i slave address	Initial addresses for analog values in data record 25 or 26
1	2
2	10
3	18
4	26
5	34
6	42
7	50
8	58
9	66
10	74
11	82
12	90
13	98
14	106
15	114
16	122
17	130
18	138
19	146
20	154
21	162
22	170
23	178
24	186
25	194
26	202
27	210
28	218
29	226
30	234
31	242

Examples of access:

Access to analog channel 1 of slave 7 has an offset of 50.

Access to analog channel 1 of slave 30B has an offset of 238.

8.2.1.13 Write_AODI

Meaning

This call writes the process image of the analog output data of the AS-i line of an AS-i master.

Structure of the RecordDataRead service – Index 26

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Slave 1, channel 1 or slave 1A, channel 1							
3								
4	Slave 1, channel 2 or slave 1A, channel 2							
5								
6	Slave 1, channel 3 or slave 1B, channel 1							
7								
8	Slave 1, channel 4 or slave 1B, channel 2							
9								
...								
...								
242	Slave 31, channel 1 or slave 31A, channel 1							
243								
244	Slave 31, channel 2 or slave 31A, channel 2							
245								
246	Slave 31, channel 3 or slave 31B, channel 1							
247								
248	Slave 31, channel 4 or slave 31B, channel 2							
249								

You can use analog value access with the entire AS-i line to save I/O address space in the S7 station.

Note

For more information on the mapping of the analog values in the data record, refer to Section 8.2.1.12.

8.2.1.14 Read_AS-i_Line_Errorcounters

Meaning

This call reads out AS-i line-specific error counters. Bytes 30–37 signal the AS-i slave on which the error occurred (bit=1: error exists).

Meaning of the counters:

Error	Meaning
AS-i Power Fail	AS-i power supply missing, too low, not stable.
Ground short	A short to ground has occurred on AS-i line A or B.
Slave failure	The slave was taken out of the list of activated slaves (LAS) (after several consecutive timeouts).
Missing slave frame	Slave response of an existing slave was not received.
Bad slave frame	Slave response of a slave is mutilated or corrupt.
I/O error	Slave signals “Peripheral Fault” in the response to Read_Status.
Protocol error	Error in data transfer according to CTT1–5 (for example, bad or missing toggle bit, ...).
Bad master frame	AS-i master detects an error in its own send frame (by checking the receive line).

Structure of the RecordDataRead service – Index 96

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	AS-i Power Fail						High byte	
3							Low byte	
4	Ground short						High byte	
5							Low byte	
6	Summator: Slave failure						High word / high byte	
7							High word / low byte	
8							Low word / high byte	
9							Low word / Low byte	
10	Summator: Missing slave frame						High word / high byte	
11							High word / low byte	
12							Low word / high byte	
13							Low word / Low byte	

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
14	Summator: Bad slave frame						High word / high byte	
15							High word / low byte	
16							Low word / high byte	
17							Low word / Low byte	
18	Summator: Slave I/O error						High word / high byte	
19							High word / low byte	
20							Low word / high byte	
21							Low word / Low byte	
22	Summator: Slave protocol error						High word / high byte	
23							High word / low byte	
24							Low word / high byte	
25							Low word / Low byte	
26	Summator: Bad master frame						High word / high byte	
27							High word / low byte	
28							Low word / high byte	
29							Low word / Low byte	
30	Slave 7/7A	Slave 6/6A	Slave 5/5A	Slave 4/4A	Slave 3/3A	Slave 2/2A	Slave 1/1A	Slave 0/0A
31	Slave 15/15A	Slave 14/14A	Slave 13/13A	Slave 12/12A	Slave 11/11A	Slave 10/10A	Slave 9/9A	Slave 8/8A
32	Slave 23/23A	Slave 22/22A	Slave 21/21A	Slave 20/20A	Slave 19/19A	Slave 18/18A	Slave 17/17A	Slave 16/16A
33	Slave 31/31A	Slave 30/30A	Slave 29/29A	Slave 28/28A	Slave 27/27A	Slave 26/26A	Slave 25/25A	Slave 24/24A
34	Slave 7B	Slave 6B	Slave 5B	Slave 4B	Slave 3B	Slave 2B	Slave 1B	Slave 0B
35	Slave 15B	Slave 14B	Slave 13B	Slave 12B	Slave 11B	Slave 10B	Slave 9B	Slave 8B
36	Slave 23B	Slave 22B	Slave 21B	Slave 20B	Slave 19B	Slave 18B	Slave 17B	Slave 16B
37	Slave 31B	Slave 30B	Slave 29B	Slave 28B	Slave 27B	Slave 26B	Slave 25B	Slave 24B

8.2.1.15 Read_and_Delete_AS-i_Line_Errorcounters

Meaning

The call works in the same way as “Read_AS-i_line_error_counter”. On completion, the AS-i master also sets all error counters to 0.

Structure of the RecordDataRead service – Index 97

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	AS-i Power Fail						High byte	
3							Low byte	
4	Ground short						High byte	
5							Low byte	
6	Summator: Slave failure						High word / high byte	
7							High word / low byte	
8							Low word / high byte	
9							Low word / Low byte	
10	Summator: Missing slave frame						High word / high byte	
11							High word / low byte	
12							Low word / high byte	
13							Low word / Low byte	
14	Summator: Bad slave frame						High word / high byte	
15							High word / low byte	
16							Low word / high byte	
17							Low word / Low byte	
18	Summator: Slave I/O error						High word / high byte	
19							High word / low byte	
20							Low word / high byte	
21							Low word / Low byte	
22	Summator: Slave protocol error						High word / high byte	
23							High word / low byte	
24							Low word / high byte	
25							Low word / Low byte	

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
26	Summator: Bad master frame						High word / high byte	
27							High word / low byte	
28							Low word / high byte	
29							Low word / Low byte	
30	Slave 7/7A	Slave 6/6A	Slave 5/5A	Slave 4/4A	Slave 3/3A	Slave 2/2A	Slave 1/1A	Slave 0/0A
31	Slave 15/15A	Slave 14/14A	Slave 13/13A	Slave 12/12A	Slave 11/11A	Slave 10/10A	Slave 9/9A	Slave 8/8A
32	Slave 23/23A	Slave 22/22A	Slave 21/21A	Slave 20/20A	Slave 19/19A	Slave 18/18A	Slave 17/17A	Slave 16/16A
33	Slave 31/31A	Slave 30/30A	Slave 29/29A	Slave 28/28A	Slave 27/27A	Slave 26/26A	Slave 25/25A	Slave 24/24A
34	Slave 7B	Slave 6B	Slave 5B	Slave 4B	Slave 3B	Slave 2B	Slave 1B	Slave 0B
35	Slave 15B	Slave 14B	Slave 13B	Slave 12B	Slave 11B	Slave 10B	Slave 9B	Slave 8B
36	Slave 23B	Slave 22B	Slave 21B	Slave 20B	Slave 19B	Slave 18B	Slave 17B	Slave 16B
37	Slave 31B	Slave 30B	Slave 29B	Slave 28B	Slave 27B	Slave 26B	Slave 25B	Slave 24B

8.2.2 AS-i Slave Calls

8.2.2.1 Set_Permanent_Parameter

Meaning

With this call, a parameter value for the specified AS-i slave is configured on the IE/AS-i LINK. The value is stored permanently in the storage of the IE/AS-i LINK or on the C-PLUG, if this is inserted.

The configured parameter is **not** transferred immediately by the IE/AS-i LINK to the AS-i slave. The configured parameter value is only transferred when the AS-i slave is activated after turning on the power supply on the IE/AS-i LINK.

After the job, the AS-i master changes to the offline mode and then changes to the normal mode (warm restart on the AS-i master).

For some AS-i slave profiles (combined transaction type), the AS-i master manages the AS-i slave parameter assignment itself. In this case, the parameters in the call are ignored.

Note

If you use CPUs from the SIMATIC S7 system as the PROFINET IO controller, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the IE/AS-i LINK during startup. Use of the call described here is then generally unnecessary.

Structure of the RecordDataRead service – Index 3

<table>
<tr><th rowspan="2">Byte</th><th colspan="8">Meaning</th></tr>
<tr><th>Bit 7</th><th>Bit 6</th><th>Bit 5</th><th>Bit 4</th><th>Bit 3</th><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th></tr>
<tr><td>0</td><td colspan="8">Version_hi = 0x00</td></tr>
<tr><td>1</td><td colspan="8">Version_lo = 0x00</td></tr>
<tr><td rowspan="2">2</td><td colspan="4" rowspan="2">0x0</td><td colspan="4">Parameter</td></tr>
<tr><td>P3</td><td>P2</td><td>P1</td><td>P0</td></tr>
<tr><td>3</td><td colspan="8">Reserved 0x00</td></tr>
</table>

8.2.2.2 Get_Permanent_Parameter

Meaning

This call reads out slave-specific parameters stored on the IE/AS-i LINK.

The job cannot be used for all slaves of the combined transaction type.

Structure of the RecordDataRead service – Index 4

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameter			
					P3	P2	P1	P0
3	Reserved 0x00							

8.2.2.3 Write_Parameter

Meaning

The parameters transferred with the call are passed on to the addressed AS-i slave. The parameters are stored on the IE/AS-i LINK only temporarily and are not entered as configured parameters in the EEPROM!

The AS-i slave transfers its status value in the response as parameter echo. The response can deviate from the value that has just been written according to the AS-i master specification (/2/).

Exceptions

There are some AS-i slave types with which the AS-i master itself manages the slave parameter assignment. The configured parameters for these AS-i slaves are always the same F_H. For these slaves, the AS-i master handles the AS-i slave parameter assignment itself.

Structure of the RecordDataWrite service – Index 5

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameter			
					P3	P2	P1	P0
3	Reserved 0x00							

8.2.2.4 Read_Parameter

Meaning

With this call, the current parameter of an AS-i slave is read by the IE/AS-i LINK.

This value must not be confused with the parameter echo (Section 8.2.2.19), that the AS-i slave returns as response to the “Write_Parameter” job.

Structure of the RecordDataRead service – Index 6

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameter			
					P3	P2	P1	P0
3	Reserved 0x00							

8.2.2.5 Set_Permanent_Configuration

Meaning

This call sets the following configuration data for the addressed AS-i slave.

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

The configuration data is stored permanently in the storage of the IE/AS-i LINK or on the C-PLUG, if this is inserted. The configuration data is used by the AS-i master as the desired settings for the protected mode.
This call is not made in the protected mode.

The configuration data is specified by the manufacturer of the AS-i slave. The meaning of the configuration data is described in /2/. If the addressed AS-i slave does not support an extended ID code 1/2, the value F_H must be specified.

When this call is executed, the AS-i master changes to the offline phase and then changes back to the normal mode (warm restart on the AS-i master).

A negative confirmation does not mean that the parameters are not entered in the EEPROM of the IE/AS-i LINK.

Note

If you use CPUs from the SIMATIC S7 system as the PROFINET IO controller, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the IE/AS-i LINK during startup. Use of the call described here is then generally unnecessary.

Structure of the RecordDataWrite service – Index 8

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	I/O configuration				ID code			
3	ID1 code				ID2 code			

8.2.2.6 Get_Permanent_Configuration

Meaning

This call reads the following configuration data (configured desired settings: PCD) of an addressed AS-i slave.

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

This data is read from the EEPROM of the AS-i master or from the C-PLUG, if this is inserted.

The configuration data is specified by the manufacturer of the AS-i slave. The meaning of the configuration data is described in /2/.

Structure of the RecordDataRead service – Index 9

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	I/O configuration				ID code			
3	ID1 code				ID2 code			

8.2.2.7 Read_Actual_Configuration

Meaning

This call reads the following configuration data (CDI) of an addressed AS-i slave obtained by the AS-i master on the AS-Interface.

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

The configuration data is specified by the manufacturer of the AS-i slave. The meaning of the configuration data is described in /2/.

Structure of the RecordDataRead service – Index 11

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	I/O configuration				ID code			
3	ID1 code				ID2 code			

8.2.2.8 Read_Parameter_String

Meaning

With AS-i slaves with profile 7.4, this call can be used to read a parameter string from the AS-i slave with the specified AS-i slave address.

The AS-i master returns up to 220 bytes of response data. The actual number of parameter bytes sent by the AS-i slave is signaled by the AS-i master in byte 2. The maximum number of parameter bytes is 220.

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 then not made available to the user program.

As long as the string transfer is active, there is no user/analog data exchange with the addressed AS-i slave.

Structure of the RecordDataRead service – Index 27

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (may be irrelevant)							
222	String byte 220 (may be irrelevant)							

8.2.2.9 Write_Parameter_String

Meaning

With AS-i slaves with profile 7.4, this call can be used to send a parameter string to the AS-i master that then forwards this to the specified AS-i slave address.

The call transfers a parameter string with a maximum of 220 bytes. The actual number of parameter bytes to be sent to the AS-i slave is calculated by the AS-i master from byte 2. The maximum number of parameter bytes is 220.

The remaining information in the string is not evaluated by the AS-i master and is passed on to the AS-i slave transparently. As long as the string transfer is active, there is no user/analog data exchange with the addressed AS-i slave.

Structure of the RecordDataWrite service – Index 28

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (may be irrelevant)							
222	String byte 220 (may be irrelevant)							

8.2.2.10 Read_Diagnostic_String

Meaning

With AS-i slaves with profile 7.4, this call can be used to read a diagnostic string from the AS-i slave with the specified AS-i slave address. The AS-i master returns up to 220 bytes of response data. The number of diagnostic bytes actually sent by the AS-i slave is signaled by the AS-i master in byte 2 (number of diagnostic 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 then not made available to the user program.

As long as the string transfer is active, there is no user/analog data exchange with the addressed AS-i slave.

Structure of the RecordDataRead service – Index 29

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (may be irrelevant)							
222	String byte 220 (may be irrelevant)							

8.2.2.11 Read_Identification_String

Meaning

With AS-i slaves with profile 7.4, this call can be used to read an identification string from the AS-i slave with the specified AS-i slave address. The AS-i master returns up to 220 bytes of response data. The number of ID bytes actually sent by the AS-i slave is signaled by the AS-i master in byte 2 (number of ID 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 then not made available to the user program.

As long as the string transfer is active, there is no user/analog data exchange with the addressed AS-i slave.

Note

As an exception, with this call, the bytes contained in the bits “Follows” and “Valid” are also transferred (see AS-i slave profiles of the combined transaction types).

Structure of the RecordDataRead service – Index 30

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (may be irrelevant)							
222	String byte 220 (may be irrelevant)							

8.2.2.12 Write_CTT2_String

Meaning

Using this call, a CTT2 request according to AS-i slave profile “CombinedTranslationType2” can be sent to the AS-i master as a byte string. This forwards the string bytes to the AS-i slave address specified in the send buffer.

With this call, a string with a maximum of 220 bytes is transferred to the AS-i master. The actual number of string bytes to be sent to the AS-i slave is calculated by the AS-i master from byte 2 of the send buffer (number of string bytes). The number of string bytes is set by the user program.

The CTT2 request is replied to by the addressed AS-i slave with a CTT2 response. This response can be fetched with the “Read CTT2 request” call.

The structure of the CTT2 request or CTT2 response (code, index, ...) always begins with string byte 1. For more detailed information, refer to the relevant AS-i slave description.

As long as the string transfers are handled on AS-i, there is no cyclic user data/analog data transfer with the addressed AS-i slave (this does not apply to digital I/O bits).

Due to the type of protocol, the transfer of approximately 200 bytes can take up to half a minute.

Structure of the RecordDataWrite service – Index 31

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (may be irrelevant)							
222	String byte 220 (may be irrelevant)							

8.2.2.13 Read_CTT2_String

Meaning

Using this call, an acyclic CTT2 request according to AS-i slave profile “CombinedTranslationType2” can be read from an AS-i slave.

The request written with call “Index 001F” is responded to by the slave. The response can be read with this call. In the response, the AS-i master transfers a maximum of 223 bytes, a maximum of 220 of those can be string bytes. The actual number of string bytes is contained in byte 2.

Only the last CTT2 response is read back. If several “Write_CTT2 string” jobs are sent in succession, older responses are lost.

The structure of the CTT2 request or CTT2 response (code, index, ...) always begins with string byte 1. For more detailed information, refer to the relevant AS-i slave description.

As long as strings are being transferred on AS-i, there is no cyclic analog data transfer with the addressed AS-i slave. Due to the type of protocol, the transfer of approximately 200 bytes can take up to half a minute.

Structure of the RecordDataRead service – Index 31

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (may be irrelevant)							
222	String byte 220 (may be irrelevant)							

8.2.2.14 Read_I/O_Configuration

Meaning

With this call, the I/O configuration of an AS-i slave can be read out directly over the AS-i cable. The call is intended for diagnostic purposes and is not required in the normal master mode.

Structure of the RecordDataRead service – Index 33

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				I/O configuration			
3	Reserved 0x00							

8.2.2.15 Read_ID−Code

Meaning

With this call, the ID code of an AS-i slave can be read out directly over the AS-i cable. The call is intended for diagnostic purposes and is not required in the normal master mode.

Structure of the RecordDataRead service – Index 34

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				ID code			
3	Reserved 0x00							

8.2.2.16 Read_Extended_ID−Code_1

Meaning

With this call, the extended ID1 code of an AS-i slave can be read out directly over the AS-i cable. The call is intended for diagnostic purposes and is not required in the normal master mode.

Structure of the RecordDataRead service – Index 24

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				ID1 code			
3	Reserved 0x00							

8.2.2.17 Read_Extended_ID−Code_2

Meaning

With this call, the extended ID2 code of an AS-i slave can be read out directly over the AS-i cable. The call is intended for diagnostic purposes and is not required in the normal master mode.

Structure of the RecordDataRead service − Index 35

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				ID2 code			
3	Reserved 0x00							

8.2.2.18 Read_Status

Meaning

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

Depending on the type of AS-i slave, the flags of the status register have the following meaning:

Status Bit	AS-i slave complying with standard 2.0	AS-i slave complying with standard 2.1, V3
S 0	**Address volatile** This flag is set when • the internal slave routine for permanent storage of the AS-i slave address is active. This can take up to 15 ms and must not be interrupted by a further addressing call. • the AS-i internal slave address comparison recognizes that the stored address is not the same as the entry in the address register.	**Address/ID code volatile**
S 1	**Parity error detected** This flag is set when the AS-i slave has recognized a parity error in a received frame since the last “read and delete status” job.	**I/O error detected** An AS-i slave can set this flag when it has detected and error (for example, wire break) in the attached I/Os.
S 2	**End bit error detected** This flag is set when the AS-i slave has recognized an end bit error in a frame since the last “read and delete status” job.	reserved
S 3	**Read error in non-volatile memory** This bit is set when the AS-i slave has detected a read error when reading the non-volatile memory.	

Structure of the RecordDataRead service – Index 80

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				AS-i slave status			
					S 3	S 2	S 1	S 0
3	Reserved 0x00							

8.2.2.19 Get_Write_Parameter_Echo

Meaning

The “Get_Write_Parameter_Echo” job (Section 8.2.2.3), echo values of an AS-i slave are output as the response to a “Write_Parameter” job. The echo value of an AS-i slave originates from the last parameter call sent to this AS-i slave. If several “Get_Write_Parameter_Echo” jobs are sent, the older echo values are lost.

Structure of the RecordDataRead service – Index 81

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameter			
					P3	P2	P1	P0
3	Reserved 0x00							

8.2.2.20 Write_Analog_Output_Data

Meaning

This call writes the analog output data of an AS-i slave.

Structure of the RecordDataWrite service – Index 82

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Channel 1 of the analog slave							
3								
4	Channel 2 of the analog slave							
5								
6	Channel 3 of the analog slave							
7								
8	Channel 4 of the analog slave							
9								
10	Reserved 0x0000							
11								

8.2.2.21 Read_Analog_Input_Data

Meaning

This call reads the analog input data of an AS-i slave.

Structure of the RecordDataRead service – Index 83

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Channel 1 of the analog slave							
3								
4	Channel 2 of the analog slave							
5								
6	Channel 3 of the analog slave							
7								
8	Channel 4 of the analog slave							
9								
10	Reserved 0x0000							
11								

8.2.2.22 Read_AS-i_Slave_Errorcounters

Meaning

This call reads out AS-i slave-specific error counters.

The data record can be requested by the PROFINET IO controller.

Meaning of the counters:

Error	Meaning
Slave failure	The slave was taken out of the list of activated slaves (LAS) (after several consecutive timeouts).
Missing slave frame	Slave response of an existing slave was not received.
Bad slave frame	Slave response of a slave is mutilated or corrupt.
I/O error	Slave signals “Peripheral Fault” in the response to Read_Status.
Protocol error	Error in data transfer according to CTT1−5 (for example, bad or missing toggle bit, ...).
Bad master frame (optional)	AS-i master detects an error in its own send frame (by checking the receive line).

Structure of the RecordDataRead service – Index 98

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Slave failure						High byte	
3							Low byte	
4	Missing slave frame						High byte	
5							Low byte	
6	Bad slave frame						High byte	
7							Low byte	
8	I/O error						High byte	
9							Low byte	
10	Protocol error						High byte	
11							Low byte	
12	Bad master frame						High byte	
13							Low byte	

8.2.2.23 Read_and_Delete_AS-i_Slave_Errorcounters

Meaning

This call reads out AS-i slave-specific error counters. The AS-i master then also sets all error counters to 0. The data record can be requested by the PROFINET IO controller.

Meaning of the counters:

Error	Meaning
Slave failure	The slave was taken out of the list of activated slaves (LAS) (after several consecutive timeouts).
Missing slave frame	Slave response of an existing slave was not received.
Bad slave frame	Slave response of a slave is mutilated or corrupt.
I/O error	Slave signals “Peripheral Fault” in the response to Read_Status.
Protocol error	Error in data transfer according to CTT1−5 (for example, bad or missing toggle bit, ...).
Bad master frame (optional)	AS-i master detects an error in its own send frame (by checking the receive line).

Structure of the RecordDataRead service − Index 99

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Slave failure						High byte	
3							Low byte	
4	Missing slave frame						High byte	
5							Low byte	
6	Bad slave frame						High byte	
7							Low byte	
8	I/O error						High byte	
9							Low byte	
10	Protocol error						High byte	
11							Low byte	
12	Bad master frame						High byte	
13							Low byte	

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9 Diagnostics

This chapter...

The chapter explains the errors on the AS-Interface to lead to alarm messages.

9.1 Overview

The IE/AS-i LINK provides you with two diagnostic options:

- Interrupts and their subsequent evaluation
- Reading diagnostic data records by the PROFINET IO controller

Access mechanism

Refer to the manual of your PROFINET IO controller for information on the mechanisms for using diagnostics with the PROFINET IO controller.

Since STEP 7 system diagnostics supports the reading of channel diagnostic information for all submodules of PROFINET IO devices, there is already diagnostic integration in STEP 7.
The system function block SFB 54 is available for receiving interrupts. For information on SFB54, refer to the block helps of STEP 7.

9.2 Interrupts

Interrupts can divided into the following groups:

- Remove/insert module interrupts
  Remove/insert module interrupts can be evaluated in the S7 user program using OB83.
- Diagnostic interrupts
  Diagnostic interrupts can be evaluated in the S7 user program using OB82.

9.2.1 Remove/Insert Module Interrupts

Remove/insert module interrupts are signaled over the logical I/O address or diagnostic address of the relevant slot (slot 1–63, 101–163).

Notice

The IE/AS-i LINK only signals remove/insert module interrupts when the IE/AS-i LINK is operating in protected mode.

Remove interrupt

If a configured AS-i slave fails, a remove module interrupt is generated at the assigned slot.

Insert interrupt

When a configured AS-i slave returns, an insert module interrupt is generated at the assigned slot.

Insert interrupt wrong module

If the wrong AS-i slave returns (different from the configured slave), an insert interrupt wrong module is generated at the assigned slot.

9.2.2 Diagnostic Interrupts

These interrupts instigate channel diagnostics (PROFINET IO format ID 8000_H).

Slave-specific diagnostic interrupts (for example slave I/O error) are signaled over the logical I/ address or the diagnostic address of the relevant slot (slot 1–63, 101–163).

Line-specific diagnostic interrupts (for example AS-i Powerfail) are signaled over the logical I/O address or diagnostic address of the line proxy module (slot 0 or 100).

Notice

The IE/AS-i LINK only signals diagnostic interrupts when the IE/AS-i LINK is operating in protected mode and when the particular diagnostic interrupt is enabled in the PROFINET IO configuration.

“Diagnostics entering state” interrupt

The interrupt is output when a diagnostic interrupt is generated.

“Diagnostics exiting state” interrupt

The interrupt is output when a generated diagnostic interrupt disappears.

Evaluation of the diagnostic information

Detailed diagnostic information can be evaluated in SIMATIC S7 using SFB54 ”RALRM” with the block parameter AINFO. You will find the interrupt structure in the documentation or the help on SFB54. The link-specific significance of the error types (AINFO, bytes 32–33) is described below.

Errors that trigger a diagnostic interrupt on the AS-i line

The following errors cause diagnostic interrupt:

Table 9-1 Link-specific Error Types

Error Type	Error Description	Slot	Channel Number	Cause
0010_H	Slave too many	Line proxy (slot 0 / 100)	AS-i address of extra slave: 0...31, 33...63	• An unconfigured AS-i slave was detected. • Error involving a configured (entered in the LPS) AS-i slave, for which no I/O module was inserted in HW Config.
0011_H	AS-i Powerfail	Line proxy (slot 0 / 100)	8000_H (entire line)	AS-i master detects a problem in the power supply (for example wire break).
$001A_H$	External error (periphery error)	0...63 or 100...163	8000_H (entire line)	The AS-i slave signals an error on the slave periphery.
0180_H	Ground short	Line proxy (slot 0 / 100)	8000_H (entire line)	AS-i master detects ground short on the AS-i line.
8008_H	Ethernet port: Link down	Device proxy (slot 0, diagnostic address of the Ethernet port)	8000_H (entire PROFINET IO device)	AS-i master detects “No connection” on the Ethernet port.

9.3 Diagnose Data Records

Further diagnostic information can be read out from the IE/AS-i LINK using the data record interface (Section 8.2) for example “Get_LPS_LAS_LDS_LPF_Flags” or “Read_and_delete_AS-i_Line_Errorcounters”.

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10 Dealing with Problems / Error Displays

This chapter...

This chapter contains information on the special modes of the IE/AS-i LINK and explains how to deal with errors.

10.1 Replacing a Defective AS-i Slave/Automatic Address Programming

Simple Replacement of AS-i Slaves

Using the automatic address programming function, you can replace failed AS-i slaves extremely simply.

Notice

Remember that “automatic address programming” is only possible in the following situations:

– The function is enabled

– The IE/AS-i Link is in the protected mode

– Only one AS-i slave has failed.

The sections below explain how to replace failed AS-i slaves using the automatic address programming function.

Detecting a Defective AS-i Slave

If the AUP LED is lit, this indicates the following:

- Exactly one slave has failed.
- Automatic address programming by the IE/AS-i LINK is possible.

You can identify the failed AS-i slave, for example in the display in “AS-i –> Lifelist”.

You can now replace the defective AS-i slave as follows:

Replace the defective AS-i slave with an **identical** AS-i slave with address zero (default address).

The IE/AS-i LINK now programs this slave with the address of the original slave you are replacing.

The “AUP” and “CER” LEDs go off.

10.2 Error Displays/Remedying Errors

The following table lists the possible causes of problems during operation of the IE/AS-i LINK and possible remedies.

You will see the corresponding error messages on the display or via WBM.

Table 10-1 Error/fault displays of the LEDs for the IE/AS-i LINK (top right)

“LED” / Fault/error	Possible Cause	Remedy
”SF” lit	IE/AS-i LINK signals remove/insert module interrupts or diagnostic information to the PROFINET IO controller. Causes: Parameter assignment/ configuration errors on PROFINET or on the AS-Interface.	Check the “SF”, “APF” and “CER” LEDs in the AS-i line block. Evaluate the bits in the slave diagnostic information to identify the error in greater detail.
”BF” LED lit (indicates an error on LAN attachment)	The connection to the PROFINET IO controller is interrupted.	Check PROFINET connector on the PROFINET IO controller and on the IE/AS-i LINK.
“BF” flashes.	Wrong PROFINET IO controller mode (STOP).	Check/correct PROFINET IO controller mode.
	The PROFINET device name configured on the PROFINET IO controller does not match that of the IE/AS-i LINK.	Check/correct PROFINET IO controller configuration.
”ON” LED is not lit	No operating voltage on the IE/AS-i LINK.	Check the connection of the AS-i power supply unit and if necessary replace it.

Table 10-2 Error/fault displays of the LEDs for the AS-i line (bottom right)

“LED” / Fault/error	**Possible Cause**	**Remedy**
”SF” lit	IE/AS-i LINK signals remove/insert module interrupts or diagnostic information to the PROFINET IO controller. Causes: Configuration error on the AS-Interface (for example slave failed) or AS-i Power Fail.	Check the “CER” and “APF” LEDs. Evaluate the bits in the slave diagnostic information to identify the error in greater detail.
”APF” LED lit	The power requirements of the AS-i slaves are too high or the power supply unit is inadequate for the power requirements. Result: The voltage on the AS-i cable is too low.	Check the power requirements of the AS-i slaves. If necessary, supply the AS-i slaves with an external voltage.
”CER” LED is permanently lit.	The IE/AS-i LINK is not yet configured.	Configure the IE/AS-i LINK.
	A configured AS-i slave has failed (evaluate the slave display on the display).	Replace the defective AS-i slave or reconfigure the IE/AS-i LINK if the AS-i slave is not required.
	An unconfigured slave was connected to the AS-i cable.	Remove the AS-i slave or reconfigure the IE/AS-i LINK.
	An AS-i slave was connected whose configuration data (I/O configuration, ID code) do not match the values of the configured AS-i slave.	Check whether the wrong slave has been connected. If necessary, reconfigure the IE/AS-i LINK.
	Disruptions on the AS-i cable.	Check the AS-i cable and the connected AS-i slaves.
The “CER” LED flickers, in other words a configured slave is lost sporadically.	Bad contact	Check the electrical connections of the AS-i slaves.
	Interference on the AS-i cable.	Check the correct grounding of the IE/AS-i LINK and check the AS-i cable. Check that the shield of the AS-i power supply unit is connected correctly.
The “CER” LED and the LEDs of active AS-i slaves flicker irregularly.	An extender is installed in the AS-Interface with “Line1” and “Line2” and the connections are reversed.	Correct the connections on the extender.

Table 10-2 Error/fault displays of the LEDs for the AS-i line (bottom right)

“LED” / Fault/error	**Possible Cause**	**Remedy**
After failure of an AS-i slave, “AUP” remains off.	IE/AS-i LINK is in configuration mode.	”Automatic Address Programming” is not possible in configuration mode. Program the address of the new AS-i slave with the address programmer or using the data record interface of the IE/AS-i LINK.
	More than one AS-i slave has failed.	Check the AS-i cable. If “APF” is displayed at the same time, check the power supply on the AS-i cable. If more than one slave is defective, program the address on the replaced slaves using the addressing unit.
	The IE/AS-i LINK has detected unconfigured AS-i slaves.	Remove the unconfigured AS-i slaves from the AS-i cable.
Automatic address programming does not work although “AUP” was previously lit.	The configuration data (I/O configuration, ID code) of the replaced AS-i slave do not match the values of the original slave.	Check whether the correct “replacement slave” was used. Compare the information from the manufacturer about configuration data. If you want to replace the original slave with a different type, assign the address with the addressing unit and reconfigure the IE/AS-i LINK.
	The replaced AS-i slave does not have the address “0”.	Address the replaced slave at address 0 or the correct target address. (for example with the display).
	The replaced AS-i slave is not correctly connected or is defective.	Check the connections of the slave and if necessary replace the slave.
The IE/AS-i LINK does not switch from configuration mode to protected mode (”CM” not lit).	An AS-i slave with address 0 is connected to the AS-i cable. IE/AS-i LINK cannot switch to the protected mode as long as this slave exists.	Remove the AS-i slave with address 0.

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A AS-Interface Protocol Implementation Conformance Statement (PICS)

PICS for IE/AS-INTERFACE LINK PN IO

Table A-1

Vendor	SIEMENS AG
Product Name	IE/AS-INTERFACE LINK PN IO
Order Number	6GK1 411−2AB10 single master 6GK1 411−2AB20 double master
Version	1
Master Profile	M4
Date	August 2006

List of Master Functions Available

This section describes whether and how the functions can be used during operation. Many of the functions are also available over the display or WBM.

Symbols in column 3 (M4)

Symbol	Meaning
X	Function exists
−	Function does not exist

Table A-2

No.	Function or Call on the Host Interface (symbolic representation)	M4	Comment / Function implemented by / see Section
1	Image, Status = Read_IDI()	X	By access to the I/O data of the IE/AS-i LINK by the PROFINET IO controller.
2	Status = Write_ODI(Image)	X	By access to the I/O data of the IE/AS-i LINK by the PROFINET IO controller.
3	Status = Set_Permanent_Parameter(Addr, Param)	X	By the PROFINET parameter assignment or by call (see Section 8.2)
4	Param, Status = Get_Permanent_Parameter(Addr)	X	see Section 8.2
5	Status, Param = Write_Parameter(Addr, Param)	X	see Section 8.2
6	Status, Param = Read_Parameter(Addr)	X	see Section 8.2

Table A-2 , (Fortsetzung)

No.	Function or Call on the Host Interface (symbolic representation)	M4	Comment / Function implemented by / see Section
7	Status = Store_Actual_Parameters()	X	see Section 8.2
8	Status = Set_Permanent_Configuration(Addr, Config)	X	see Section 8.2
9	Status, Config = Get_Permanent_Configuration(Addr)	X	see Section 8.2
10	Status = Store_Actual_Configuration()	X	By keypad and display; also with a call (see Section 8.2)
11	Status, Config = Read_Actual_Configuration(Addr)	X	see Section 8.2
12	Status = Set_LPS(List31)	X	see Section 8.2
13	Status, List31 = Get_LPS()	X	see Section 8.2
14	Status, List31 = Get_LAS()	X	see Section 8.2
15	Status, List32 = Get_LDS()	X	see Section 8.2
16.0	Status = Get_Flags()	X	see Section 8.2
16.1	Status, Flag = Get_Flag_Config_OK()	X	see Section 8.2
16.2	Status, Flag = Get_Flag_LDS.0()	X	see Section 8.2
16.3	Status, Flag = Get_Flag_Auto_Address_Assign()	X	see Section 8.2
16.4	Status, Flag = Get_Flag_Auto_Prog_Available()	X	see Section 8.2
16.5	Status, Flag = Get_Flag_Configuration_Active()	X	see Section 8.2
16.6	Status, Flag = Get_Flag_Normal_Operation_Active()	X	see Section 8.2
16.7	Status, Flag = Get_Flag_APF()	X	see Section 8.2
16.8	Status, Flag = Get_Flag_Offline_Ready()	X	see Section 8.2
16.9	Status, Flag = Get_Flag_Periphery_OK()	X	see Section 8.2
17	Status = Set_Operation_Mode(Mode)	X	By keypad and display; also with a call (see Section 8.2)
18	Status = Set_Offline_Mode(Mode)	X	see Section 8.2
19	Status = Activate_Data_Exchange(Mode)	–	optional call
20	Status = Change_Slave_Address(Addr1, Addr2)	X	see Section 8.2
21.1	Status = Set_Auto_Address_Enable	X	see Section 8.2
21.2	Status = Get_Auto_Address_Enable	X	see Section 8.2
22.1	Status, Resp = Cmd_Reset_ASI_Slave(Addr, RESET)	–	optional call

Table A-2 , (Fortsetzung)

No.	Function or Call on the Host Interface (symbolic representation)	M4	Comment / Function implemented by / see Section
22.2	Status, Resp = Cmd_Read_IO_Configuration(Addr, CONF)	X	see Section 8.2
22.3	Status, Resp = Cmd_Read_Identification_Code(Addr, IDCOD)	X	see Section 8.2
22.4	Status, Resp = Cmd_Read_Status(Addr, STAT)	X	see Section 8.2
22.5	Status, Resp = Cmd_Read_Reset_Status(Addr, STATRES)	–	optional call
22.6	Status, Resp = Cmd_Read_Ext_ID-Code_1(Addr, IDCOD1)	X	see Section 8.2
22.7	Status, Resp = Cmd_Read_Ext_ID-Code_2(Addr, IDCOD2)	X	see Section 8.2
23	Status, S_List = Get_LPF()	X	see Section 8.2
24	Status = Write_Extended_ID-Code_11(S_Ext_ID-Code_1)	X	see Section 8.2
25	AImage, Status = Read_AIDI()	X	see Section 8.2
26	Status = Write_AODI(AImage)	X	see Section 8.2
27	String, Status = Read_ParamStr(S_Addr)	X	see Section 8.2
28	Status = Write_ParamStr(S_Addr, String)	X	see Section 8.2
29	String, Status = Read_DiagStr(S_Addr)	X	see Section 8.2
30	String, Status = Read_IdentStr(S_Addr)	X	see Section 8.2
Part B	**Supported Slave Profiles**		
1	Support of extended address mode	X	
2	Support of Combined transaction type 1 integrated (S-7.3 only)	X	
3	Full support of Combined transaction type 1 integrated	X	Only profiles 7.3/7.4 are supported.
4	Support of Combined transaction type 2 integrated	X	
5	Support of Combined transaction type 3 integrated	X	
6	Support of Combined transaction type 4 integrated	X	

Table A-2 , (Fortsetzung)

No.	Function or Call on the Host Interface (symbolic representation)	M4	Comment / Function implemented by / see Section
7	Support of Combined transaction type 5 integrated	X	

How the AS-i cycle time depends on the number of connected slaves

The AS-i cycle time can be calculated using the following formula:

t_{cycl} = (1 + number of activated AS-i slaves) x 154 µs

Note

If two AS-i slaves with extended addressing mode occupy the same address (for example, address 5A and address 5B), this slave pair is calculated as one AS-i slave in the above formula. The reason for this is that slave pairs with the same address are addressed only in every second cycle. The cycle time in the formula above is therefore doubled for such slaves.

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B References

/**1**/ AS-Interface. Das Aktuator-Sensor-Interface für die Automation
AS-Interface. The Actuator-Sensor-Interface for Automation

Werner Kriesel, O.W. Madelung, Carl Hanser Verlag München Wien 1999

/**2**/ AS-Interface Complete Specification

can be ordered from the AS-International Association e.V.

Address:

AS-International Association
Zum Taubengarten 52
D-63571 Gelnhausen
Germany

Tel.: +49 – 6051 – 473212
Fax.: +49 – 6051 – 473282

(The AS-i technology is promoted by the AS-Interface Association e. V.)

Internet address of the AS-International Association e.V.:

http://www.as-interface.net

/**3**/ /**4**/ SIMATIC NET
Industrial Communication for Automation and Drives
Catalog IK PI
Siemens AG

SIMATIC
Products for Totally Integrated Automation and Micro Automation
Catalog ST 70
Siemens AG

/**5**/ SIMATIC NET
AS-Interface – Introduction and Basic Information
Manual
Siemens AG

Obtaining catalogs and information

You can order these catalogs and obtain additional information from your local Siemens branch or distributor.

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C Notes on the CE Mark

Product name:

IE/AS-i LINK (single master)	Order no.: 6GK1 411–2AB10
IE/AS-i LINK (double master)	Order no.: 6GK1 411–2AB20

EC Directive EMC 2004/108/EC

The product listed above meets the requirements of the EU directive 2004/108/EC “Electromagnetic Compatibility”.

The EU conformity certificates are available for the relevant authorities according to the EU directive and are kept at the following address:

Siemens Aktiengesellschaft
Industry Automation
Industrielle Kommunikation (A&D SC IC)
Postfach 4848
D-90327 Nuremberg, Germany

Area of Application

The product meets the following requirements:

Area of Application	Requirements	
	Emission	Immunity
Industrial area	EEN 61000–6–4 Class A	EN 61000–6–2

If the product is used in a domestic area, it may interfere with other devices.

Installation Instructions

The product meets the requirements providing you adhere to the instructions for installation and operation as described in this documentation:

Notes for the Manufacturers of Machines

The product is not a machine in the sense of the EU directive on machines. There is therefore no declaration of conformity relating to the EC Machinery Directive 98/37/EC for this product.

If the product is integrated as part of a machine, it must be included in the conformity application of the manufacturer.

D Glossary

D.1 Terms Relating to AS-Interface

AIDI – Analog input data image
Analog input data image of all AS-i slaves of an AS-i cable on the AS-i master.

AODI – Analog output data image
Analog output data image of all AS-i slaves of an AS-i cable on the AS-i master.

APF
AS-i Power Fail Flag or LED display that indicates that the power supply on the AS-i cable is too low or has failed (for example failure of the AS-i power supply unit).

AS-i (AS-Interface)
Actuator-sensor interface. A network system for the lowest field area of the automation range. It is suitable for networking sensors and actuators with control devices. (previously: SINEC S1)

AS-i A/B slave
AS-i A/B slaves use the extended addressing mode. Pairs of A/B slaves can be assigned to one address on the AS-Interface; by organizing addresses in this way, up to 62 AS-i A/B slaves can be attached to the AS-Interface.

AS-i analog slave
AS-i analog slaves are special AS-i slaves that exchange analog values with the AS-i master.

AS-i master
The AS-i master is used to monitor and control the simplest binary actuators and sensors via AS-i modules or AS-i slaves.
A distinction is made between a “standard AS-i master” and the “extended AS-i master”.

AS-i module

For the AS-Interface, a module concept has been defined that allows the block-like linking of AS-i slaves – sensors and actuators – via AS-i modules.
The following types of module exist:
- The **active** AS-i module with an integrated AS-i chip; using this, up to four conventional sensors and actuators can be connected.
- The **passive** AS-i module; this functions as a distributor and provides a connection for up to four sensors and actuators with an integrated AS-i chip.

In keeping with the concept of the standard AS-i master and the extended AS-i master, either AS-i chips with standard functions or with extended functions are used in the AS-i slaves.

AS-i slave

All the nodes that can be addressed by an AS-i master are known as AS-i slaves.
AS-i slaves are distinguished by their design (AS-i modules and sensors or actuators with an integrated AS-i attachment) and their address range (AS-i standard slaves and AS-i A/B slaves with the extended addressing mode).

AS-i standard slave

An AS-i standard slave always occupies one address on the AS-Interface; with this address organization, up to 31 AS-i standard slaves can be attached to the AS-Interface.

CDI – Configuration data image

The CDI contains the current copies of the I/O configuration (input/output configuration) and the identification codes (ID, ID1, ID2) of the AS-i slaves. The AS-i master stores this list in volatile memory.

Combined Transaction Type (CTT)

Communication protocols on AS-Interface according to the Specification V3.0 for the transfer of larger amounts of data (analog values, strings, etc.).

Extended AS-i master

An extended AS-i master (M4) supports 31 addresses that can be used for standard AS-i slaves or AS-i slaves with the extended addressing mode. This increases the number of addressable AS-i slaves to a maximum of 62.
The extended AS-i masters from SIMATIC NET support the integrated transfer of AS-Interface analog slaves operating according to the 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 1–5 according to AS-i Specification V3.0).

Protected mode

In protected mode, the IE/AS-i LINK exchanges data only with the configured AS-i slaves. ”Configured” means that the slave addresses stored on the IE/AS-i LINK and the configuration data match the values of the existing AS-i slaves.

Actual configuration

The actual configuration in volatile memory of the IE/AS-LINK. These are the AS-i slaves with which the IE/AS-LINK communicates.
(See also “Expected configuration”)

LAS – List of activated slaves

A bit for every activated AS-i slave is set in this list. The bits of slaves that have not been activated are reset (zero). The AS-i master stores this list in volatile memory.

LDS – List of detected slaves

A bit for every detected AS-i slave is set in this list. The bits of slaves that have not been detected are reset (zero). The AS-i master stores this list in volatile memory.

LPF – List of periphery faults

This list contains the information whether or not a periphery fault has occurred for each activated slave (bit is set). If no periphery fault has occurred, the bit is reset (zero). The AS-i master stores this list in volatile memory.

LPS – List of projected slaves

A bit is set in this list for every configured AS-i slave. The bits of slaves that have not been configured are reset (zero). The LPS is stored in non-volatile memory (or on the C-PLUG if inserted).

PCD – Permanent configuration data

The PCD , like the CDI, contains the I/O configuration from project engineering (input/output configuration) and the identification codes (ID, ID1, ID2) of the AS-i slaves. The PCD is stored in non-volatile memory (or on the C-PLUG if inserted).

Expected configuration

The expected configuration is stored in non-volatile memory (or on the C-PLUG) of the IE/AS-LINK. This may possibly differ from the current “actual configuration” (see above).

Standard AS-i master

Up to 31 standard slaves or slaves with the extended addressing mode (A slaves only) can be attached to a standard AS-i master.

D.2 Terms Relating to PROFINET

CP

Communications processor: Module for communications tasks for installation in computers or programmable logic controllers.

Firmware

Firmware; here, the software running on the device.

Device database

Device databases (GSD, or for PROFINET GSDML) contain device descriptions of PROFINET IO devices. The use of GSD files makes it easier to configure the IO device and AS-i slaves.

GSDML file

The GSDML file contains the device database and is written in XML format for PROFINET.

IOCS / IOPS

Input/Output Consumer State / Input/Output Provider State: Data status that is transferred for each PN IO submodule for consumer and provider.

SIMATIC NET

Siemens SIMATIC Network and Communication. Product name for networks and network components from Siemens.

TIA

Based on the individual customer requirements, Totally Integrated Automation (TIA) allows branch-specific automation solutions to be implemented that greatly increase productivity while ensuring that investment remains secure.

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