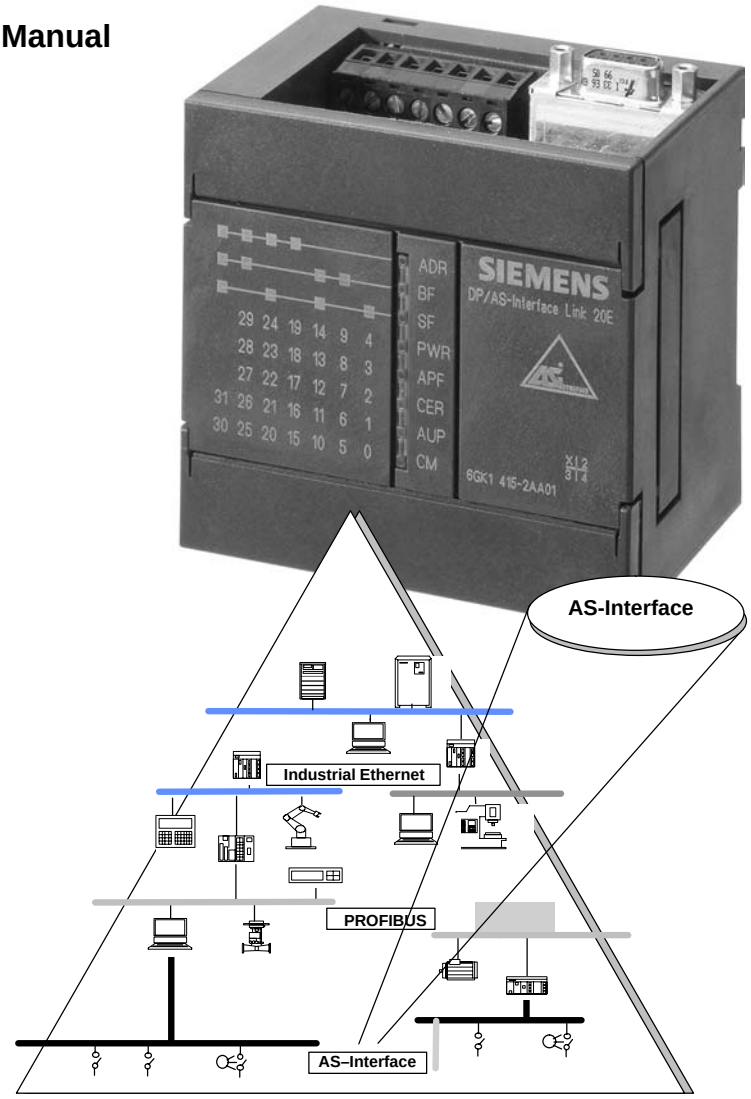
SIEMENS

SIMATIC NET

DP/AS-Interface Link 20E

Manual



Release 11/2002
C79000-G8976-C138–04

Classification of 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 or severe personal injury **will** result if proper precautions are not taken.

Warning

indicates that death or 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.

Caution

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 result 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.

EU Directive: Do not start up until you have established that the machine on which you intend to run this component complies with the directive 89/392/EEC.

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Prior to Startup

Prior to startup, note the following:

Caution

Prior to startup, note the information and follow the instructions in the latest documentation. You will find the ordering data for this documentation in the relevant catalogs or contact your local Siemens office.

Disclaimer of Liability

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 **DP/AS-Interface Link 20E** module, shortened to **DP/AS-i Link 20E** in the following chapters. It contains information about how PROFIBUS DP masters can address AS-i actuators and AS-i sensors via this module.

We recommend the following procedure when...

... 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.

... You want to set up an AS-i system and include the DP/AS-i Link 20E module in it:

– You will find the information you require about connecting and operating the DP/AS-i Link 20E module in Chapter 1.

... You want to know how to operate the DP/AS-i Link 20E from the point of view of the PROFIBUS DP master:

– Read Chapter 2 in this manual.

– Chapter 3 explains the command interface.

Requirements

To understand this manual, you require the following:

- A working knowledge of PROFIBUS DP
- You should be familiar with the ‘AS-Interface Introduction and Basic Information’ manual (not supplied with this documentation package).

Diskette with the GSD file

The accompanying diskette contains the GSD file that you require for configuring a DP/AS-i Link 20E module with your DP master (see Section 1.9.1).

❑

DP/AS-Interface Link 20E
Release 11/2002
C79000-G8976-C138–04

Contents

DP/AS-Interface Link 20E
Release 11/2002
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Technical Description, Installation Instructions, Operation

1

This chapter explains the performance, installation and basic functions of the master module DP/AS-Interface Link 20E module (DP/AS-i Link 20E).

You will learn the following:

- How to install the DP/AS-i Link 20E module
- The display and control elements of the DP/AS-i Link 20E module
- How to configure the DP/AS-i Link 20E module with the push button
- How to configure a SIMATIC S7 DP master in STEP 7
- How to set the PROFIBUS address for the DP/AS-i Link 20E module

1.1 General Notes on Operation – Safety Warnings

Caution

When handling and installing the DP/AS-i Link 20E module, make sure that you adhere to the ESD guidelines.

The DP/AS-i Link 20E module must only be connected when the AS-i power supply unit is turned off.

Caution

Noise immunity/grounding

To ensure the noise immunity of the DP/AS-i Link 20E module, both the DP/AS-i Link 20E module and the AS-i power supply unit must be grounded correctly.

Caution

The AS-i power supply unit used must provide a low voltage, safely isolated from the network. 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

Note

The DP/AS-i Link 20E module can be configured, installed and started up independent of the PROFIBUS installation.

1.2 Application of the Module

DP Slave and AS-Interface Master

The DP/AS-i Link 20E module is both a PROFIBUS DP slave and an AS master at the same time:

- The DP/AS-i Link 20E module connects the actuator-sensor interface with PROFIBUS DP.
- Using the DP/AS-i Link 20E module, you can access the inputs and outputs of the AS-i slaves from PROFIBUS DP. Depending on the slave type, you can access binary values or analog values.

  The following AS-i slaves can be used:

  – Standard Slaves / AS–i Analog Slaves

  – Slaves with the extended addressing mode

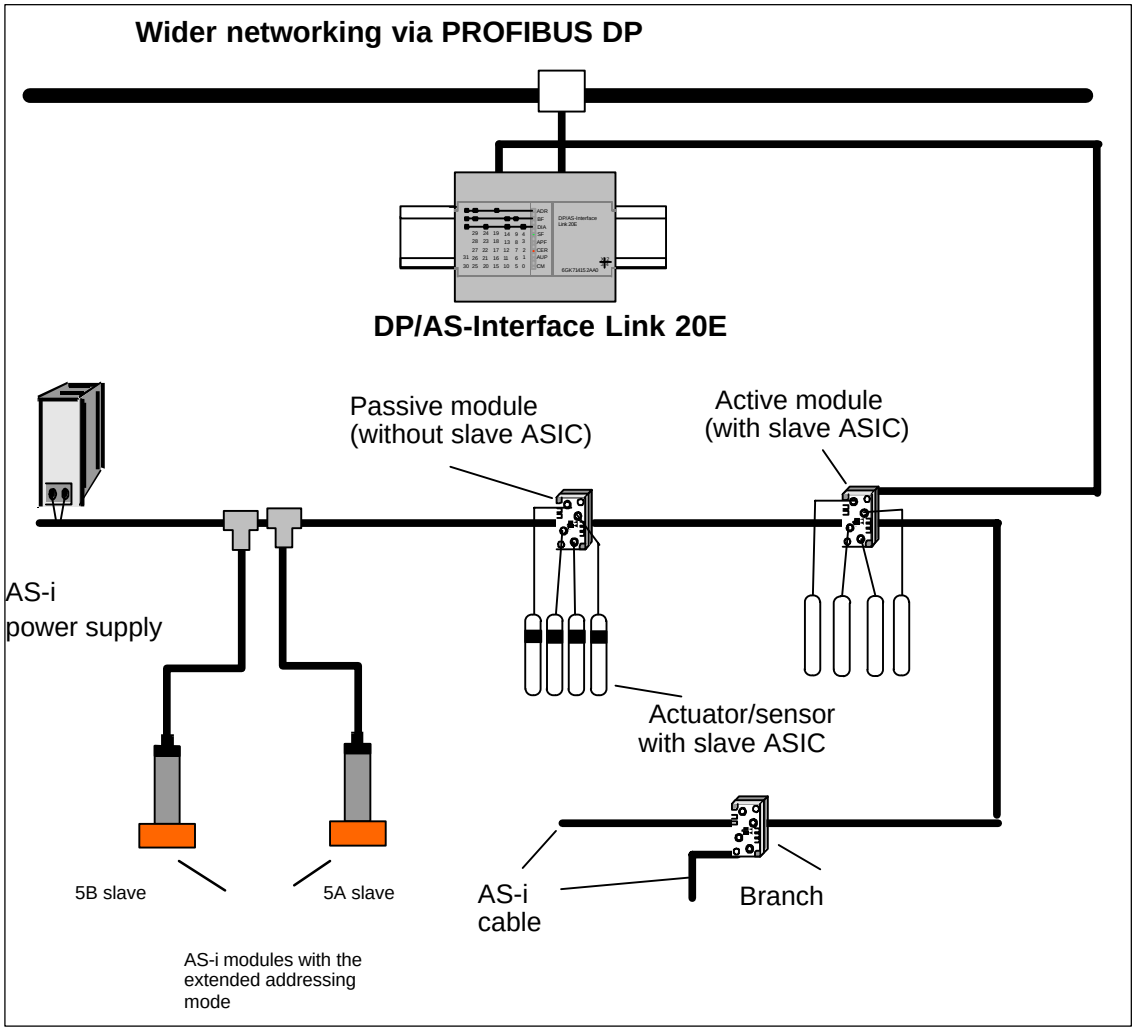


Figure 1-1 Example of a System Configuration with the DP/AS-i Link 20E Module

Features

The DP/AS-i Link 20E allows byte and word-consistent exchange of I/O data with a DPV0, DPV1 master and the AS-i slaves.

- DPV0 mode

  In the DPV0 mode and using a maximum of 32/32 bytes from the I/O area, up to 62 digital AS-i slaves can be operated at a transmission rate of 9.6 Kbps up to 12 Mbps. The command interface and the simple access to the AS-i analog values using the AS-i slave profile 7.3/7.4 are not available in the DPV0 mode.

- DPV1 mode

  In the DPV1–/DPx mode and using a maximum of 32/32 bytes from the I/O area, up to 62 digital AS-i slaves can be operated at a transmission rate of 9.6 Kbps up to 12 Mbps. In addition to this, the services read_record/write_record allow a maximum of 32 AS-i analog slaves with up to 4 analog I/O channels to be operated.

  Commands complying with the AS-i master specification M1e are implemented with the read_record/write_record (record 2) services.

Components of the Product

The product DP/AS-i Link 20E includes the following components:

- DP/AS-i Link 20E
- Product information for the DP/AS-i Link 20E

1.3 Technical Data of the Module

The DP/AS-i Link 20E module has the following technical data:

Table 1-1

Feature	Explanation/Values
AS-i cycle time	• 5 ms for 31 slaves • 10 ms for 62 slaves with the extended addressing mode
Configuration of the AS-Interface	With the button on the front panel or with STEP 7
Supported AS-i master profiles	M1e
Connection of the AS-i cable	Via a 7-pin terminal block Permitted current loading from terminal 1 to terminal 3 or terminal 2 to terminal 4, maximum 3 A
Connection to PROFIBUS	Via 9-pin sub D female connector
PROFIBUS address setting	– Address range 1 to 126 – Set with SET and DISPLAY buttons
Permitted loading 5V DC at PROFIBUS connector	max. 90 mA
Data rates supported (transmission rate) on PROFIBUS	9.6 Kbps; 19.2 Kbps; 45.45 Kbps; 93.75 Kbps; 187.5 Kbps; 500 Kbps; 1.5 Mbps; 3 Mbps; 6 Mbps; 12 Mbps
Power supply from the AS-i cable	According to the AS-i specification
Current consumption from the AS-i cable	max. 200 mA
Power consumption	3.7 W
Ambient conditions	
• Operating temperature	Horizontal installation: 0 to 60°C Vertical installation: 0 to 45°C
• Transportation and storage temperature	–40°C to +70°C
• Relative humidity	max. 95% at +25°C
Construction	
• Type of protection	IP 20
• Dimensions (W x H x D) in mm	90 x 80 x 62
• Weight	approx. 200 g

1.4 Installing the Module

Options

The DP/AS-i Link 20E module has type of protection IP 20.

- You can install the DP/AS-i Link 20E module on a normal standard rail (complying with EN 50022).
- As an option, you can also install the module on a wall directly using the mounting holes in the casing.

Installation on a Standard Rail

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

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

Removing the Module from the Standard Rail

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

1. When removing the module from the standard rail, the power supply and signal cables must be removed first.
2. After the cables have been disconnected, press the catch on the module down 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.

Vertical Installation

The standard rail can also be installed vertically. Due to the reduced convection, the maximum permitted ambient temperature is reduced to 45°C.

Fit a grounding clip to the standard rail below the DP/AS-i Link 20E to prevent it slipping down on the standard rail.

1.5 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 DP/AS-i Link 20E module.

In operation, the connection and control elements are protected by a front cover.

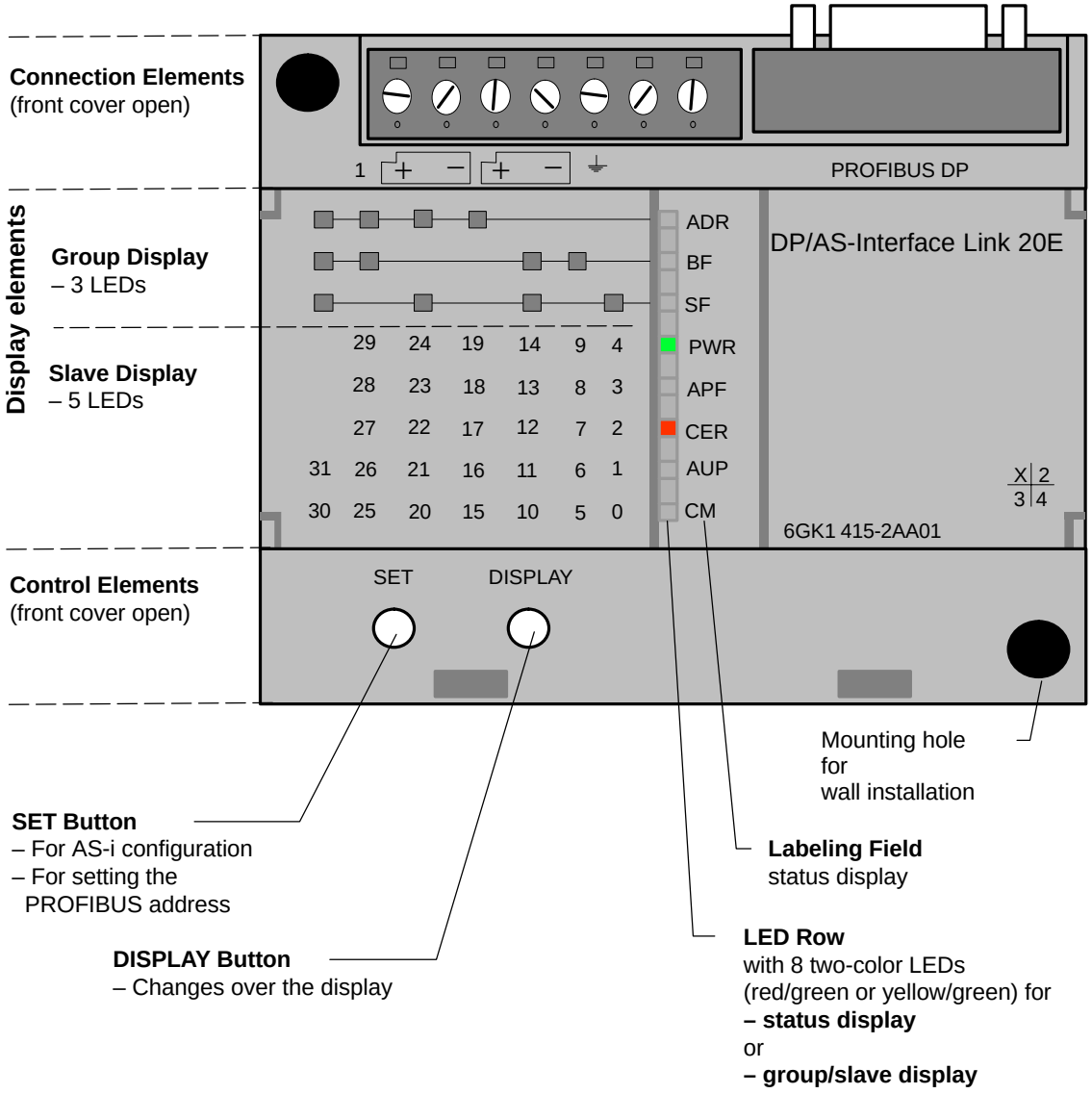


Figure 1-2 Front Panel

Connections, Operator Controls and Interpreting the Displays

For more detailed information, refer to the following sections.

1.6 Connection Elements

Connections

The DP/AS-i Link 20E module has the following connections:

- Two connections to the AS-i cable (bridged internally)
- One connection for functional earth
- One connection to PROFIBUS (9-pin sub D female connector)

The connectors are located below the upper cover of the front panel of the DP/AS-i Link 20E module.

Connections to the AS-i cable

The DP/AS-i Link 20E module has two connections for AS-i cables that are jumpered internally in the DP/AS-i Link 20E module.

This allows the DP/AS-i Link 20E module 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 DP/AS-i Link 20E module must not be looped into the AS-i cable but must be connected with a tap line (only one pair of connectors of the DP/AS-i Link 20E module is used).

The DP/AS-i Link 20E module is supplied with power entirely from the AS-Interface.

The current consumption from the AS-Interface is 200 mA.

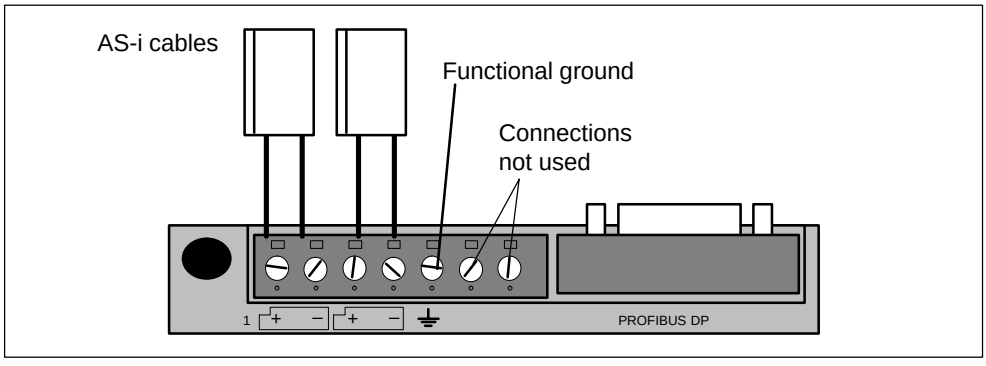


Figure 1-3 Connection of the AS-i Cable

Caution

The free terminals 6 and 7 in the terminal block must not be connected.

Note

Functional Ground (terminal ⏚)

The DP/AS-i Link 20E module has a connection for functional ground. This connector should be connected to the PE conductor with as little resistance as possible.

Connection to PROFIBUS DP

Connection to PROFIBUS DP is via a 9-pin sub D female connector.

Warning

When laying and installing the PROFIBUS DP cable and the bus connector, follow the instructions in /5/.

To connect to PROFIBUS DP, bus connectors are available with cable outlets at different angles (0°, 30° and 90°). Once again, follow the instructions in /5/.

1.7 Display and Control Elements

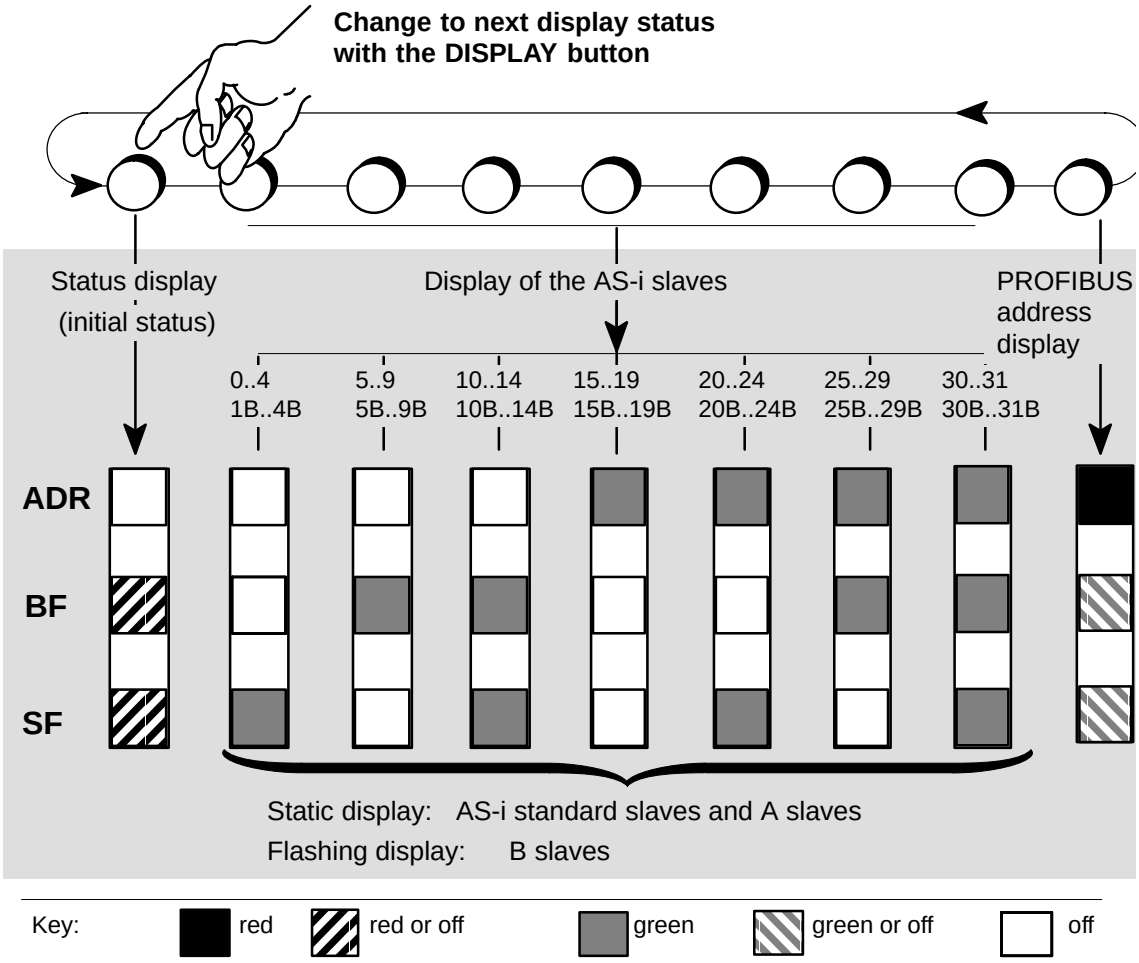
Meaning of the ADR, BF and SF LEDs

The front panel of the DP/AS-i Link 20E module has a row with 8 LEDs (see Figure 1-2). All the LEDs are 2-color (red/green or yellow/green). The upper three LEDs (ADR, BF and SF) make up the group display. They indicate the display status.

Changing the Display Status – DISPLAY Button

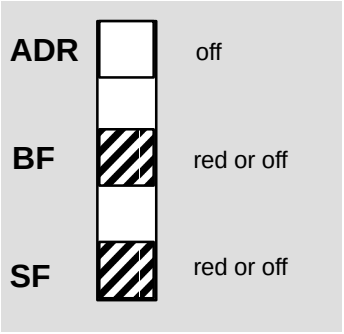
The following figure shows the possible display statuses of the group display.

You can change between the status display, slave display and PROFIBUS display with the **DISPLAY** button. Each time you press the button, you change to the next display status finally returning to the initial status.



1.7.1 Status Display

Interpreting the Status Display



The status display is the default standard display in the basic status of the DP/AS-i Link 20E module. No group LED is lit green. The “ADR” LED must also not be lit red.

The lower 7 LEDs indicate the status of the DP/AS-i Link 20E; the label to the right of the LEDs then applies.

The bottom 5 LEDs indicate errors/states on the AS-Interface. The BF LED indicates an error on PROFIBUS-DP

Meaning of the 7 Lower LEDs

When the status display is active, the LEDs have the following significance:

Table 1-2

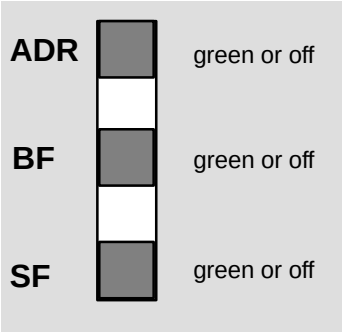
LED (color)	Status	Meaning
BF (red)	Bus Failure	Indicates errors on PROFIBUS DP. The LED is lit when: • The connection between the DP master and the DP/AS-i Link 20E module has broken down or the DP master is not active. • The DP/AS-i Link 20E module was not or was incorrectly configured/assigned parameters by the DP master.
SF (red)	System error	The LED is lit when: • In the protected mode, a diagnostic interrupt (entering state) was triggered on the DP master. • The DP/AS-i Link 20E has detected an internal error (for example EEPROM defective). • While pressing the SET button, the DP/AS-i Link 20E module cannot currently make the required mode change (for example a slave exists with address 0).
PWR (green)	Run	The LED is lit when the DP/AS-Interface Link 20E is supplied with power.
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. Note: The DP/AS-i Link 20E module is supplied with power entirely from the AS-Interface. Total failure of the AS-i power supply can therefore no longer be displayed by AS-i Power Fail. You can recognize this situation because the “PWR” LED is not lit.

Table 1-2 , (continued)

LED (color)	Status	Meaning
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-i Link 20E module. If they do not match, the “CER” LED is lit. The “CER” LED is lit in the following situations: • When a configured AS-i slave does not exist on the AS-i cable (for example failure of the slave). • When an AS-i slave exists on the AS-i cable but it was not previously configured. • When an attached AS-i slave has different configuration data (I/O configuration, ID code) from the slave configured on the DP/AS-i Link 20E. • When the DP/AS-i Link 20E module is in the offline mode.
AUP (green)	Autoprog available	In the protected mode of the DP/AS-i Link 20E 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 Chapter 5.1).
CM (yellow)	Configuration Mode	This LED displays the mode of the DP/AS-i Link 20E module. • LED lit: configuration mode • LED unlit: protected mode The configuration mode is only required for installing and starting up the DP/AS-i Link 20E module. In the configuration mode, the DP/AS-i Link 20E module activates all connected AS-i slaves and exchanges data with them. For more information about the configuration mode, refer to Section 1.8.

1.7.2 Slave Display for AS-i Slaves

Interpreting the slave display status



The slave display can be recognized by the fact that at least one group LED is lit green and that the ADR LED is not red.

The lower 5 LEDs then indicate the slaves on the AS-Interface. In this case, the label to the left of the LEDs applies. The display always represents 5 slaves.

Display Statuses and Operation in Detail

The AS-i slaves are displayed in groups of five. The upper three group LEDs indicate (in green) which of the groups of 5 is displayed. The following distinction is also made:

- Static display: AS-i standard slaves and A slaves
- Flashing display: B slaves

The lower five LEDs are lit green to indicate the detected or active AS-i slaves within the group.

You can move from group to group by pressing the DISPLAY button again.

The module returns to the status display in the following situations:

- After displaying the last group (AS-i slaves 30, 31) and pressing the DISPLAY button twice. (In other words changing to the PROFIBUS address display and then to the status display.)
- If you do not press the DISPLAY button for approximately 8 minutes.

Characteristics of the Slave Display

- If the DP/AS-i Link 20E module is in the **configuration mode**, all **detected** AS-i slaves are displayed.
- If the DP/AS-i Link 20E module is in the **protected mode**, all **active** AS-i slaves are displayed. In the protected mode, failed or existing but unconfigured AS-i slaves are indicated by the corresponding LED flashing.

Example of a Slave Display

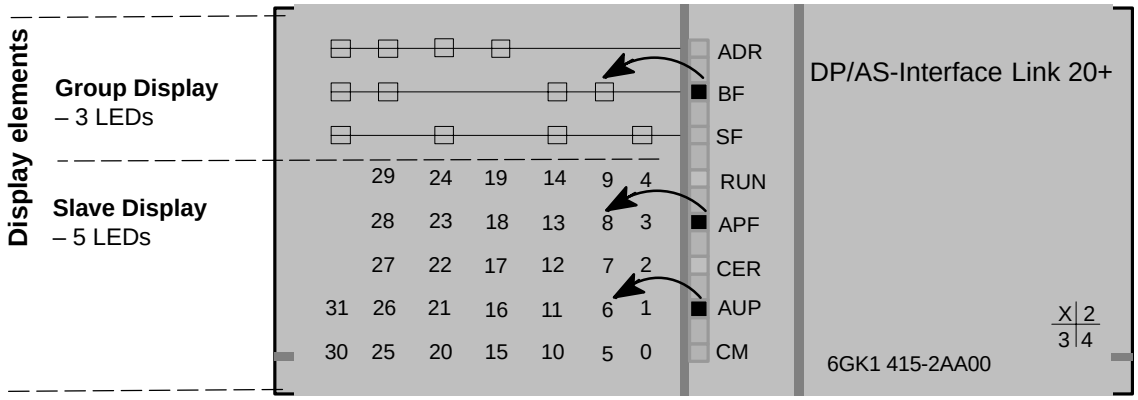


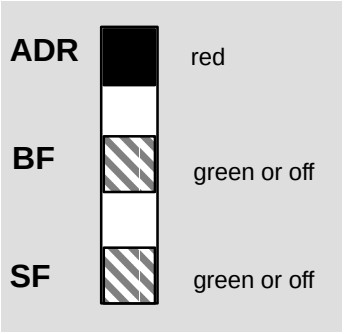
Figure 1-4 Example of a Slave Display

From the display you can obtain the following information:

- The group LEDs indicate the second group of five.
- Within this group, the active AS-i slaves 6 and 8 are displayed by the lower five LEDs.

1.7.3 Displaying and Setting the PROFIBUS Address

Interpreting the PROFIBUS Address Display



If the top LED (“ADR”) of the group display is lit up red, the 7 lower LEDs indicate the PROFIBUS address of the DP/AS-i Link 20E in **binary** format.

Setting the PROFIBUS Address

To set the PROFIBUS address of the DP/AS-i Link 20E module, follow the steps outlined below:

1. Interrupt the connection to the DP master (for example by unplugging the PROFIBUS connector) or switch the DP master to STOP.

Note

The PROFIBUS address can only be set in this mode.

2. Change the display on the DP/AS-i Link 20E module until the “ADR” LED is lit red by pressing the DISPLAY button (note: starting from the status display, the button must be pressed 15 times!).

   The DP/AS-i Link 20E module then indicates the currently set PROFIBUS address using the 7 lower LEDs.

3. If you now press the DISPLAY button, the DP/AS-i Link 20E returns to the status display, the set PROFIBUS address is retained.

   If, on the other hand, you press the SET button, you can set a new value for the PROFIBUS address. First of all, the “BF” LED flashes and the most significant bit of the PROFIBUS address is displayed.

4. If you press SET, this bit is set (LED on), if you press the DISPLAY button, the bit is reset (LED off). The display then jumps to the “SF” LED (next address bit of the PROFIBUS address).

5. By following the steps outlined above, you can now set or reset each of the individual bits of the PROFIBUS address.

6. When all the bits have been entered, the display of the set address bits alternates quickly red/green or yellow/green. If you press the SET button again, the set PROFIBUS address is adopted by the DP/AS-i Link 20E module. If, on the other hand, you press DISPLAY, the new address is discarded. The entry of the new address must then be repeated (as in step 4 and 5).

The value of the address bits represented by the LEDs of the PROFIBUS address is illustrated in the following example:

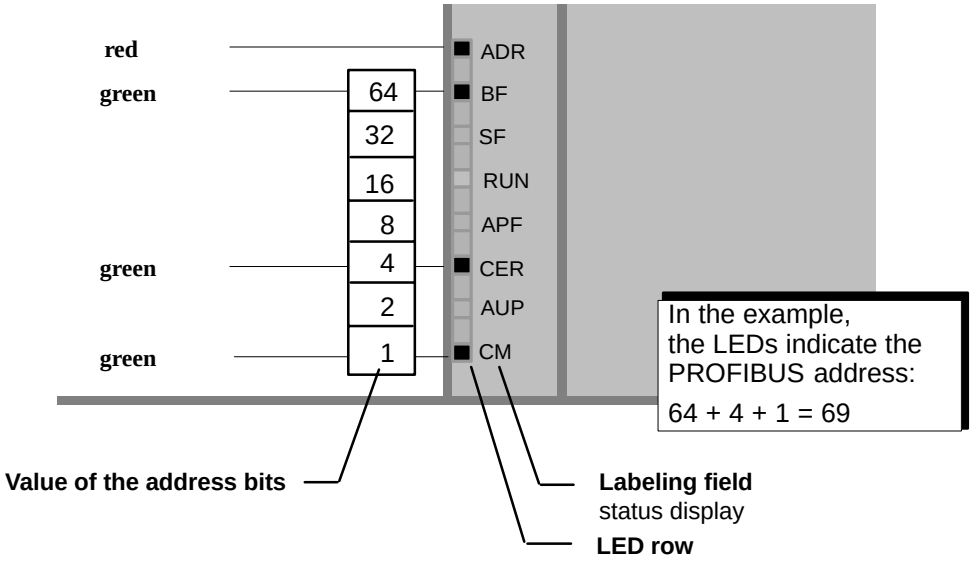


Figure 1-5

In the example above, the PROFIBUS address 69 was set with the SET/DISPLAY buttons.

The highest address that can be set is address 126. Remember that address 126 is reserved on PROFIBUS for special functions (address assignment). For data exchange with a DP master, you can use addresses 1 to 125.

1.8 Configuring the AS-Interface with the SET Button (Button Configuration)

Meaning of Button Configuration

This method of configuration allows you to commission the AS–Interface on the DP/AS–i Link 20E quickly and with little effort.

If you want to configure the AS–Interface using STEP 7 (see Section 1.9), you can skip this section.

Interpreting the Display Status

The DP/AS-Interface Link 20E module has two modes:

- configuration mode
- protected mode

If you press the SET button, the mode changes to the other mode.

Notice

Note that the SET button is only effective when the connection to the DP master is interrupted or when the DP master is set to STOP.

Configuration Mode

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

In the configuration mode, the DP/AS-i Link 20E module 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 and activated and included in the cyclic data exchange.

When installation and startup is completed, the DP/AS-i Link 20E module can be switched to the protected mode using the SET button. Any AS-i slaves active at this point are therefore configured. The AS-i slave information shown below is then stored in non-volatile memory on the DP/AS-Interface Link 20E module:

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

Protected Mode

If the DP/AS-Interface Link 20E is in the protected mode, it only exchanges data with slaves that are “configured”. In this sense, “configured” means that the slave addresses stored on the DP/AS-Interface Link 20E and the configuration data stored on the DP/AS-Interface Link 20E match the values of the existing AS-i slaves.

Preparing to Configure using Buttons

Make sure that the following situation applies:

- The data exchange between the DP master and DP/AS-i Link 20E module is interrupted or the DP master is in the STOP mode.
- The DP/AS-i Link 20E module and all AS-i slaves must be connected to the AS interface and supplied with power by the AS-i power supply unit.
- The AS-i slaves must have unique addresses other than “0”.

Notice

It is only possible to configure the AS interface in the status display or slave display status. The DP/AS-i Link 20E module must not be in the PROFIBUS address display mode; in other words when the SET button is pressed, the “ADR” LED display must not lights up red.

Configuring using Buttons

1. Press the DISPLAY button to set the DP/AS-i Link 20E display to the “status display” mode (initial status).
2. Check whether the DP/AS-i Link 20E module is in the “configuration mode”. (”CM” LED lit). If not, change the DP/AS-i Link 20E to the configuration mode using the SET button.
3. By changing to the slave display with the DISPLAY button, you can check whether all the slaves connected to the AS-Interface exist and are displayed.
4. Press the SET button. This configures the DP/AS-i Link 20E, in other words the actual configuration detected by the DP/AS-i Link 20E is stored as the default in the non-volatile EEPROM. At the same time, the DP/AS-i Link 20E module is switched to the protected mode, the “CM” LED goes off.

   The “CER” LED also goes off since the “expected configuration” stored on the DP/AS-i Link 20E module after configuration matches the existing “actual configuration” on the AS-Interface.

Notice

Changing from the configuration mode to the protected mode is only possible when there is no AS-i slave with address 0 connected to the AS-Interface. If a slave 0 is connected, the “SF” LED lights up when the SET button is pressed.

1.9 Configuring the DP/AS-i Link 20E as a DP Slave on the DP Master

Significance of the Configuration

Communication with the DP slaves differs depending on the device you are using as the DP master. Generally, you provide the information specifying the structure of the DP master system during configuration.

The following aspects of DP configuration on the DP master are explained in this section:

- The use of the GSD file
- The entries to be made in the configuration tool of the DP master
- Configuration of a DP master from the SIMATIC S7 device range in STEP 7.

1.9.1 General Procedure

Available Configuration Tools

- COM-PROFIBUS (ET 200)
- STEP 7 (SIMATIC S7)
- SIMATIC NCM PC
- Products from other manufacturers

Configurable Modes and Features of the DP Master

The following table lists the essential features of the possible DP master modes complying with DPV0 and DPV1 (see also Section 1.2)

Table 1-3

Functions Available Via the AS-i Link 20E	DPV0 Mode	DPV1 Mode
Access to binary I/O data	X	X
Convenient access to AS-i analog values complying with AS-i slave profile 7.3/7.4	–	X 1)
AS-i command interface	–	X 1)

1) With SIMATIC S7 masters with an integrated interface and with the CP 443-5 EXT, these functions are also available (at the time of printing, these functions were being prepared for the CP 342-5).

Configuring the DP Master

The following table provides an overview of how to configure the possible modes dependent on the DP master and tool used.

You should also refer to the information in the manual of the relevant configuration tool.

Table 1-4

Type of DP Master	DP master configured with...		Mode/Features
	Tool	Procedure	
• S7 with DP interface integrated in the CPU or	STEP 7 **from** Version 5 with SP3 onwards	Take DP/AS-i Link 20E from the hardware catalog and configure it in HW Config	DPV1 + configured slave configuration during startup (see Section 1.9.4)
• S7 with DP attachment via CP 342-5 and CP 443-5	STEP 7 **up to** Version 5 with SP2	Import GSD file and set S7 mode	DPV0 or DPV1 can be selected (see Section 1.9.2)

Table 1-4 , continued

Type of DP Master	DP master configured with...		Mode/Features
	Tool	Procedure	
Standard complying with DPV0	Depending on specific master	For example import GSD file in COM PROFIBUS	DPV0
Standard complying with DPV1	Depending on specific master	For example import GSD file in COM PROFIBUS Enable DPV1 (see Section 1.9.2)	DPV1

GSD file

The GSD file also contains the information about the DP/AS-i Link 20E required by the configuration tool (for example STEP 7 or COM PROFIBUS).

The GSD file is shipped on diskette along with this manual and can also be downloaded via a modem from the Interface Center Fürth at the telephone number +49 911 737972.

The GSD file can also be downloaded from the Internet at http://www.ad.siemens.de/csinfo/ (under “All Downloads...”).

BMP File (bitmap)

To allow graphic representation of the DP/AS-i Link 20E, some configuration tools, for example STEP 7, use bitmap files. These are also supplied on the accompanying diskette.

1.9.2 Importing a GSD File

Entries in the Configuration Tool of the DP Master

If you have imported the GSD file into the configuration tool of your DP master, you can make various selections as follows:

- **Configuration**

  You can choose between the following:

  – Max. 16/16 bytes (general identification format)

    Select this configuration if your DP master can only handle DP configuration frames with a general identification format. You can then only exchange data with standard AS-i slaves or with A slaves.

  – Maximum 32/32 bytes (special identification format)

    Select this configuration if your DP master can handle DP configuration frames with a special identification format. In this case, you can use the entire binary data interface of the DP/AS Interface Link 20E.

- **Parameter Assignment**

  When setting parameters for DP operation with the DP/AS Interface Link 20E, you can select between the following operating parameters:

  – DPV1 (acyclic data) enable/disable (default “disable”)

    With these operating parameters, the “DPV1 disable” mode is the default. With this setting, **no** acyclic data transfer is possible!

    If you want to use the command interface and the analog data transfer with the AS-Interface, you must select “DPV1 = enable”.

  – Diagnostic Interrupt enable/disable (default “enable”)

    With these operating parameters, the “Diagnostic Interrupt enable” mode is the default. With this setting, the DP/AS Interface Link 20E triggers diagnostic interrupts if an error occurs.

    If you want to deactivate this response, select “Diagnostic Interrupt = disable”

  – S7 mode enable/disable (default “disable”)

    This operating parameter must be set to enable if an S7 device is used as the DP master and when the master is configured with STEP7 V5.0 SP2 or with an earlier version.

Caution

If you use a DPV0 master, you must leave the “DPV1 disable” setting! Otherwise the I/O transfer may be deactivated if AS-i errors occur.

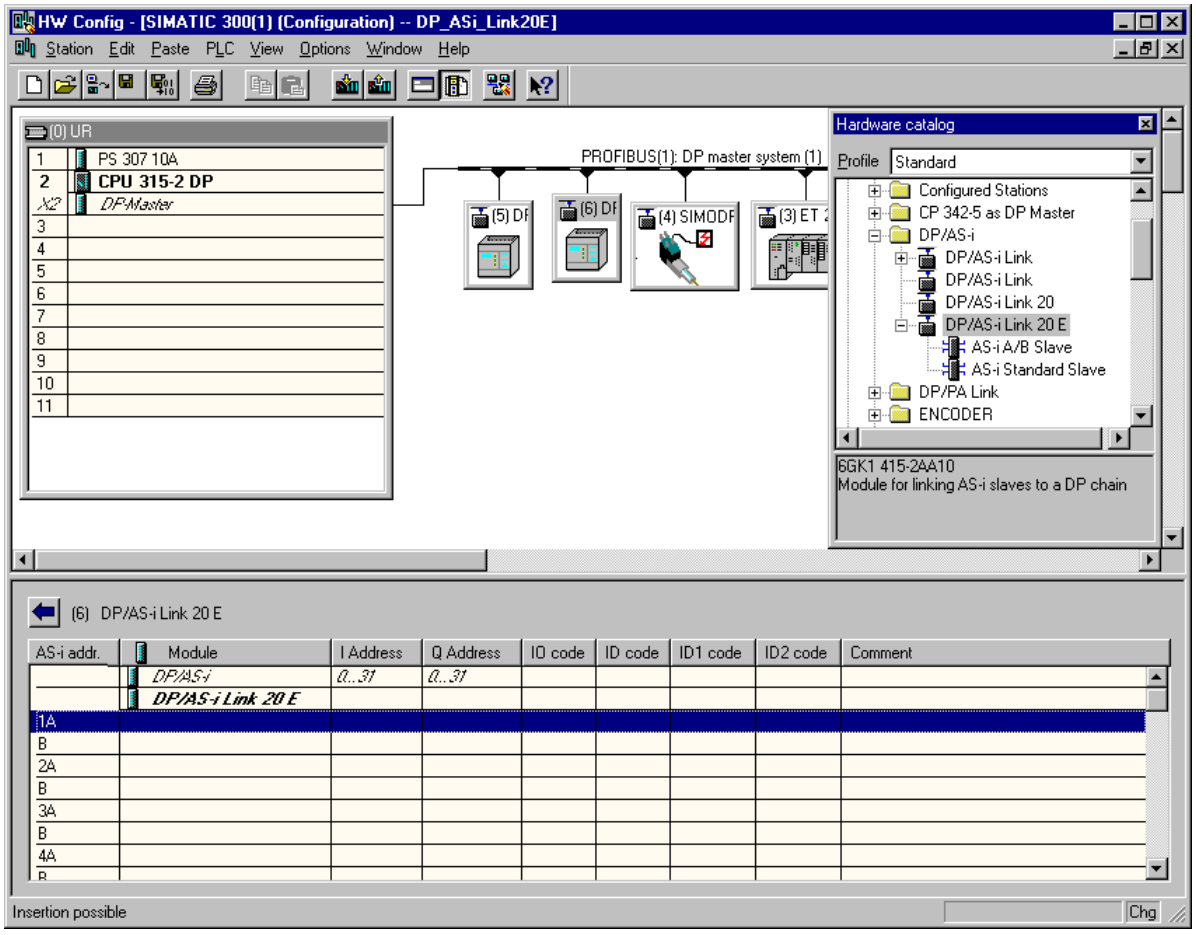
Parameter Assignment/Configuration Frame

If your DP master cannot process GSD files, under some circumstances, you can enter the parameter assignment frame and configuration frame for the DP/AS-i Link 20E module when you configure the DP master. The structure of the parameter assignment and configuration frame for the DP/AS-i Link 20E module is explained in Appendix C.

1.9.3 Configuration in STEP 7 – Basic Configuration

Configuring the DP Master System

The DP/AS-i Link 20E is taken from the hardware catalog in STEP 7 HW Config just like any other DP slave and inserted in the graphic display of the DP master system.



After you have inserted the DP/AS-i Link 20E as a DP slave, there are still no AS-i slaves to be seen in the detailed view of the station window. With this default setting, the configuration rules of “**configuration by button**” apply initially (see Section 1.8).

Configuring the Properties of the DP Slave

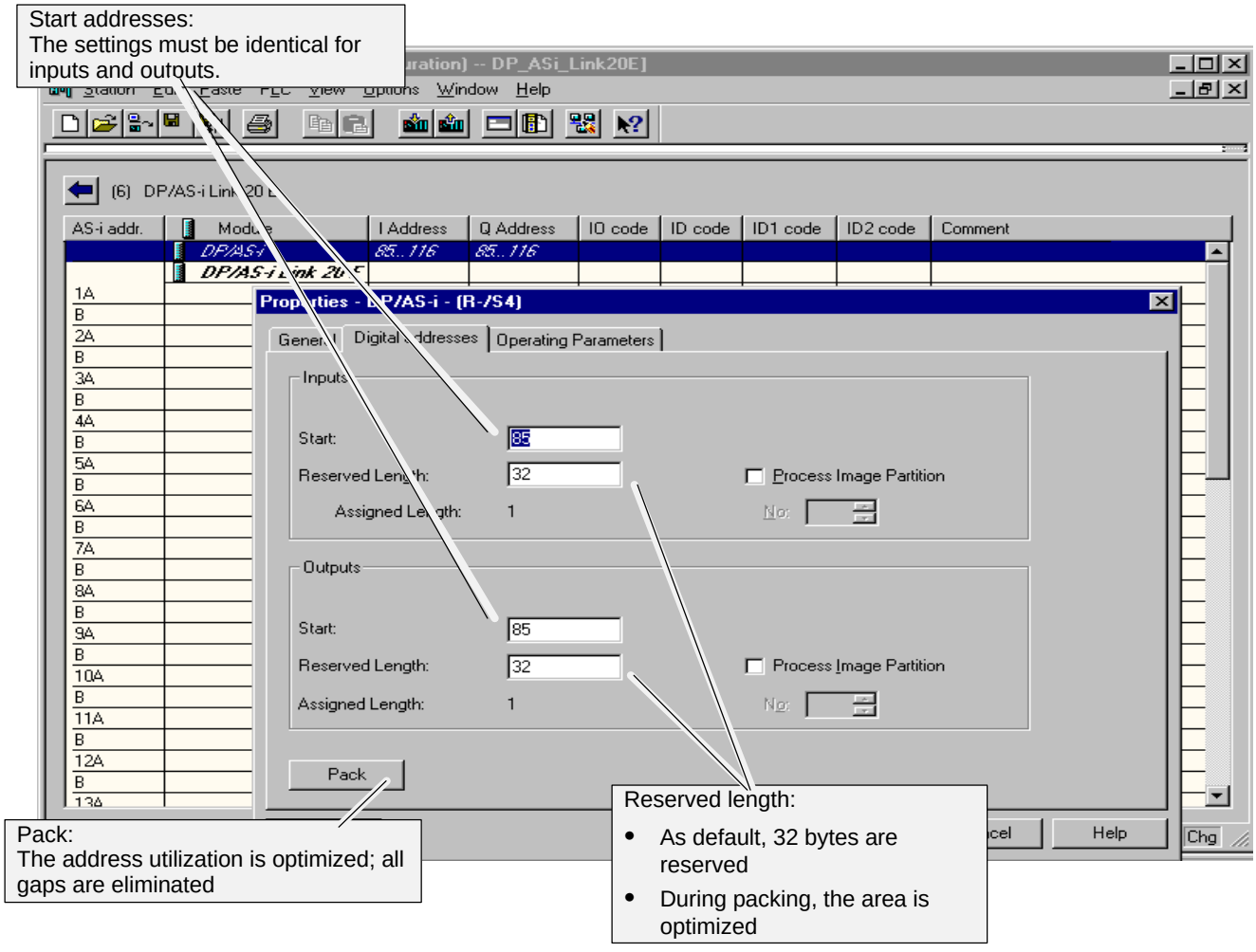
To configure general information, addresses, and operating parameters, change to the properties dialog of the DP/AS-i Link 20E.

The settings you make in this dialog are adequate to start up the DP/AS-i Link 20E with a SIMATIC S7 DP master. All further configuration information relevant to the AS-i slaves can be stored on the DP/AS-i Link 20E by configuring with the button (see Section 1.8).

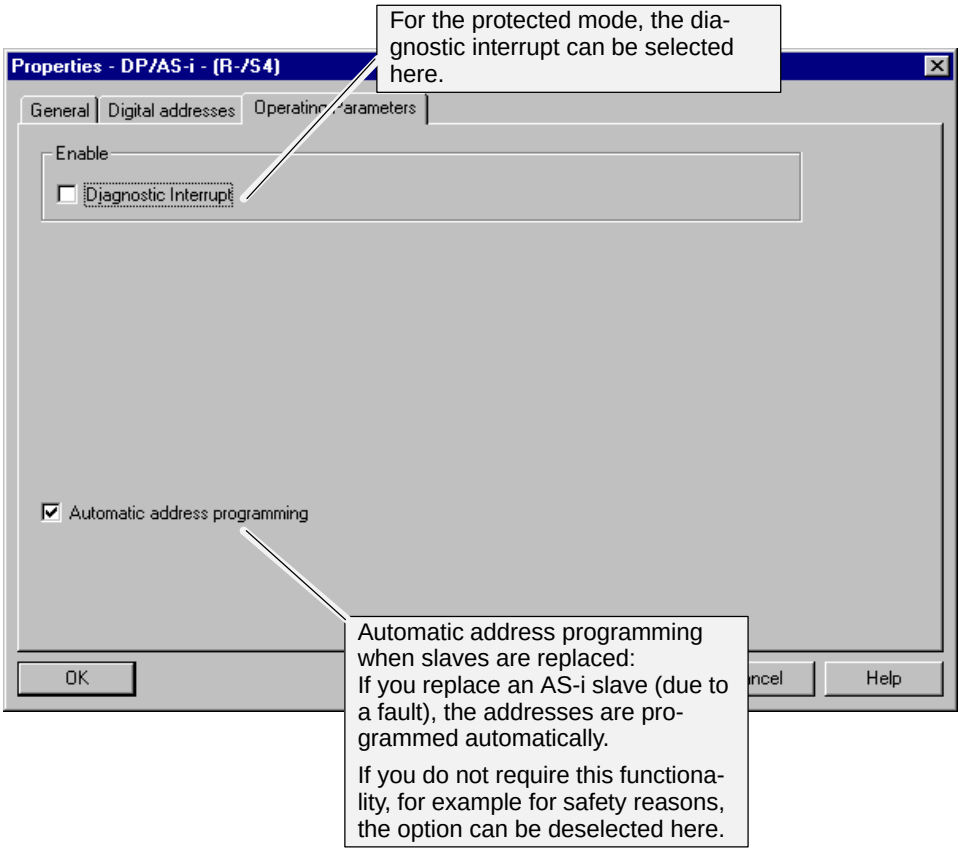
If you require a more detailed AS-i configuration using STEP 7, follow the instructions in the next section 1.9.4.

- ”Digital Addresses” tab

  To configure the address areas for the DP input data and DP output data, change to the “Digital Addresses” tab.



- ”Operating Parameters” tab



1.9.4 Configuring in STEP 7 – Slave Configuration

Meaning

Configuring AS-i slaves completely in STEP 7 as described below allows you to adapt the AS-Interface to the I/O address range of SIMATIC S7.

The settings you have made up to now in the basic configuration are adequate to start up the DP/AS-i Link 20E with a SIMATIC S7 DP master. All other configuration information relating to the AS-i slaves can then also be stored on the DP/AS-i Link 20E using the configuration button (see Section 1.8).

If you want to configure the AS-i slaves in greater detail in STEP 7, follow the instructions below.

Configuring AS-i Slaves

To set a specific slave configuration, take the AS-i slaves from the hardware catalog and insert them in a free line in the detailed view of the station window. This specifies the addresses of the AS-i slaves.

Notice

If you define the AS–I slave configuration in STEP 7, any button configuration on the DP/AS–I Link 20E is overwritten during the DP startup.

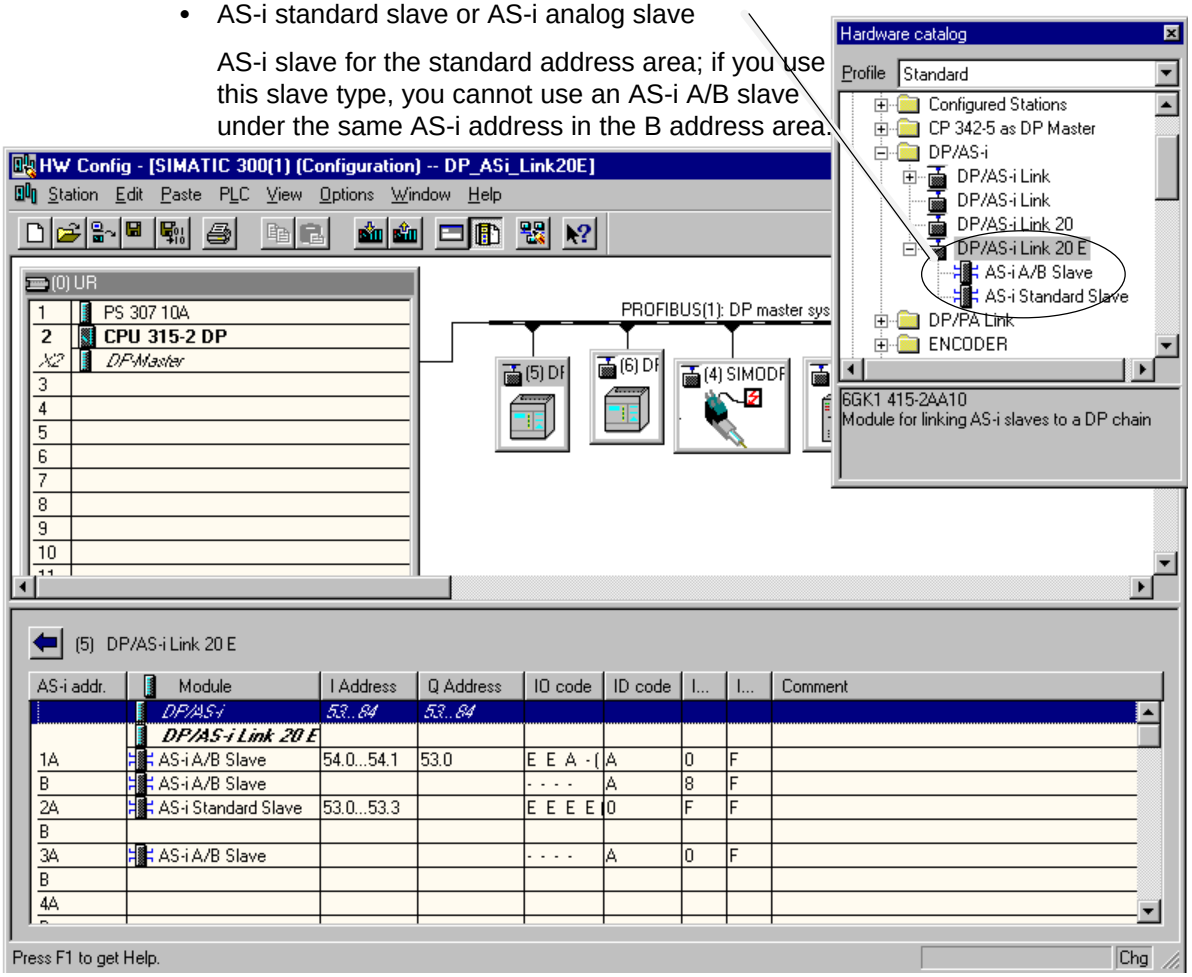
There are two types of AS-i slave available:

- AS-i A/B slave

  AS-i slave with extended addressing mode

- AS-i standard slave or AS-i analog slave

  AS-i slave for the standard address area; if you use this slave type, you cannot use an AS-i A/B slave under the same AS-i address in the B address area.



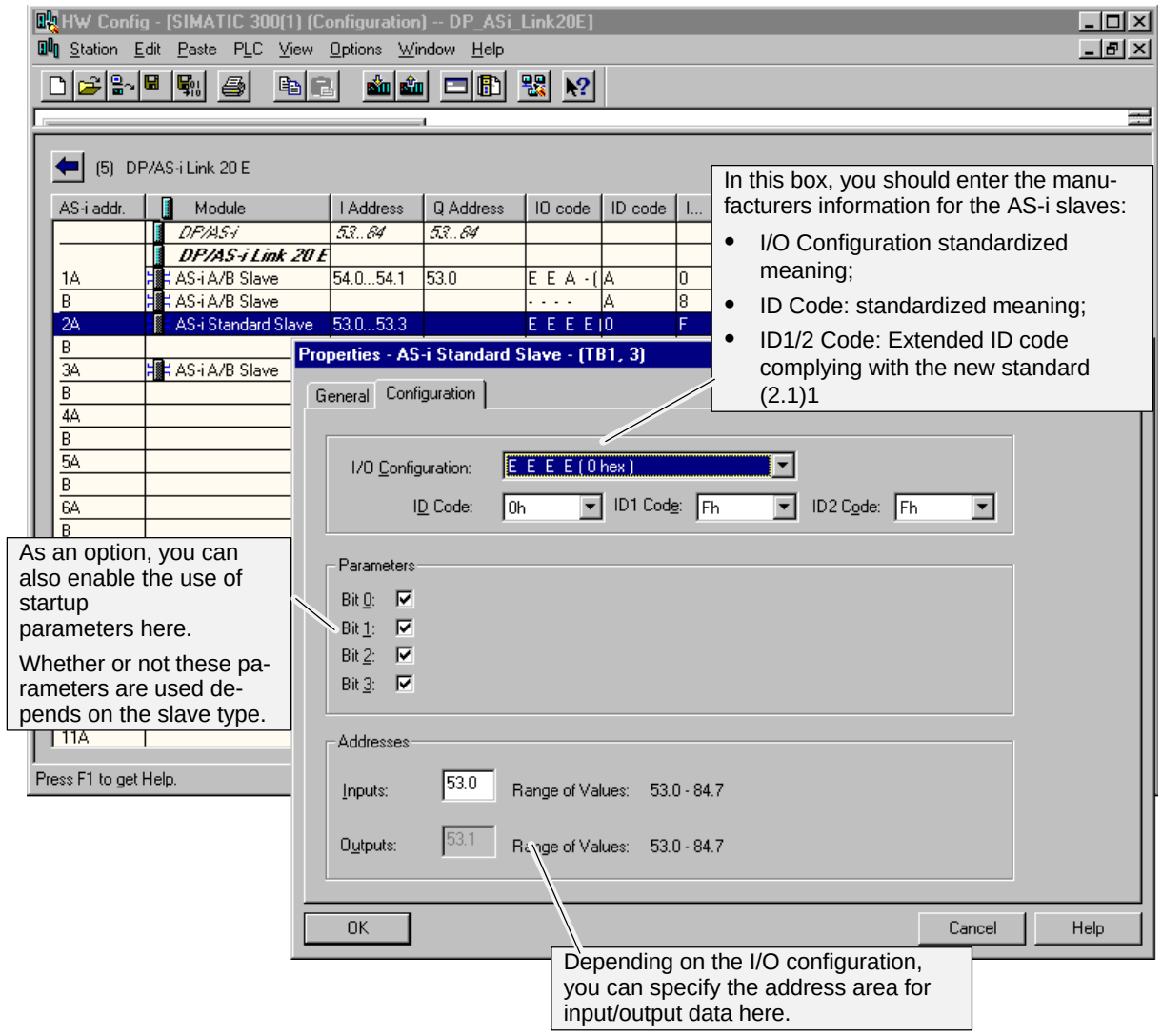
Configuring the Properties of an AS-i Slave

By configuring the properties of the AS-i slaves, you can do the following:

- Store general information for the AS-i slaves
- Enter configuration data of the AS-i slaves
- Specify the I/O configuration
- Specify I/O address areas

AS-i Standard Slave

The AS-i standard slave can only be placed in the A area of an AS-i address. The B area can then no longer by used with this AS-i address.



1 For AS-i slaves that do not support the ID1/ID2 codes, enter the values F_H.

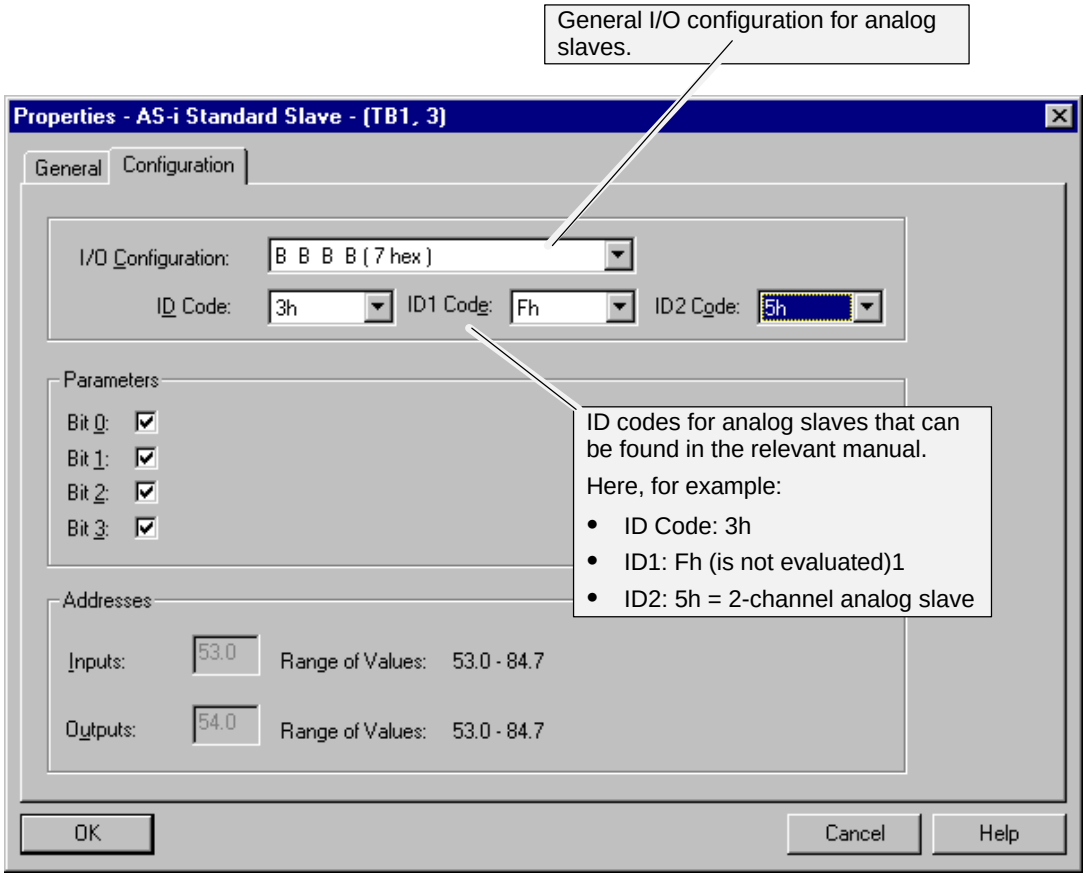
Configuring Analog Slaves as Standard Slaves

If you want to configure analog slaves you should also use the AS-i standard slave.

You set the properties of the analog interface using the combination of the I/O configuration and the three ID codes. Please refer to the manual of the AS-i slave you are using for information about the parameter settings.

These parameters are specified in compliance with the DP standard V1.

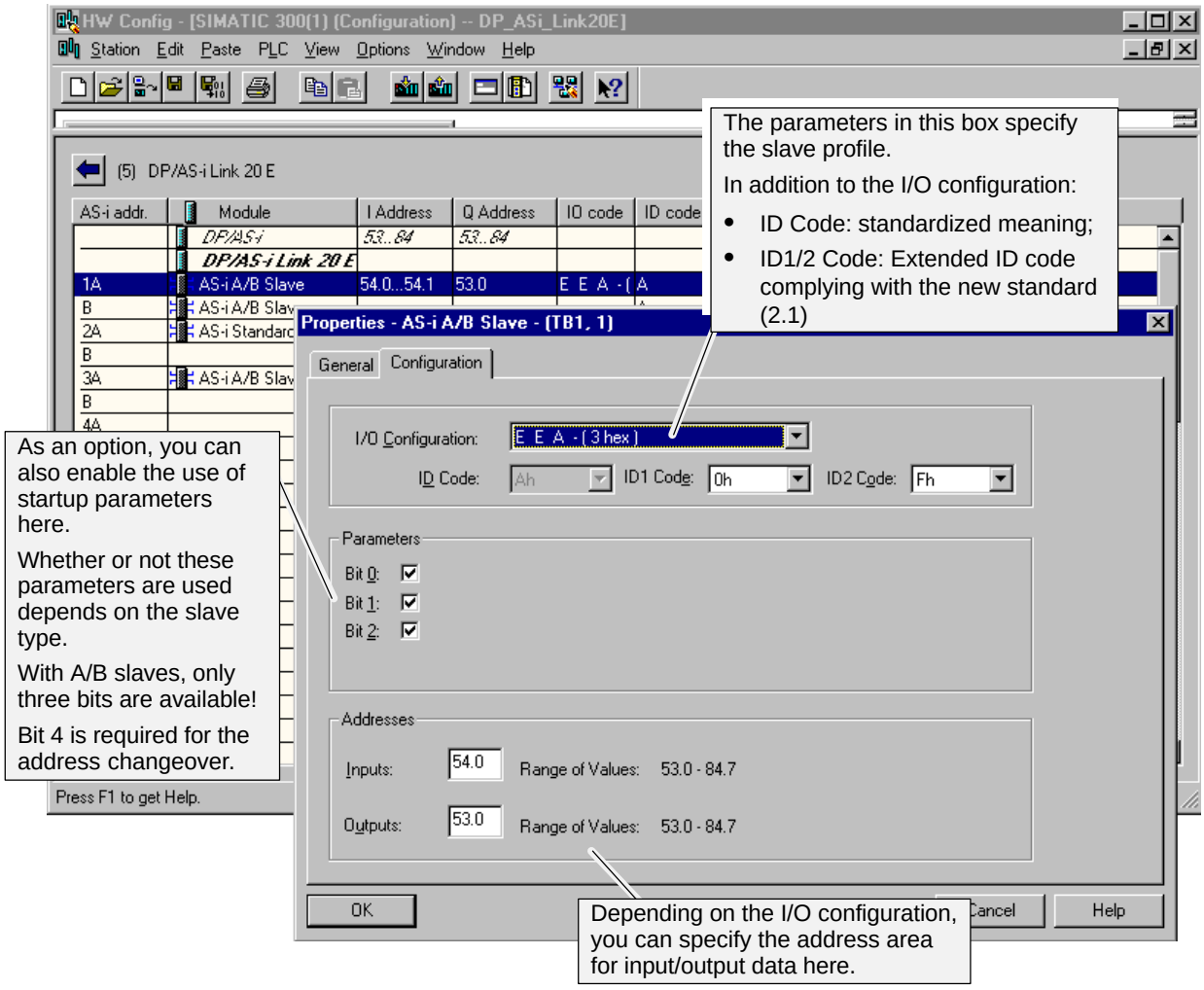
Example:



1 For AS-i slaves that do not support the ID1/ID2 codes, enter the values F_H.

AS-i A/B Slave

The AS-i A/B slave can be placed either in the A area or B area of an AS-i address. The B area can only be used when no AS-i standard slave has been placed in the A area.



1.9.5 Upload Actual Configuration

Aims

You can upload the current actual configuration over the AS–i Link 20E to the open STEP 7 project.

This allows you

- to read in a complex configuration and to use it as a basis for further configuration in STEP 7;
- to check the current configuration.

Notice

The uploaded configuration is always the current actual configuration. The actual configuration can differ from the configuration set with the buttons and stored on the AS–i master, for example, when a slave was subsequently removed or added.

If you download the configuration from the STEP 7 project to the AS–i Link 20E, the configuration detected during button configuration is overwritten.

Follow the steps below

Preparation: Create and download the basic configuration:

1. Create a basic configuration by inserting the AS–i Link 20E in a DP master system of an S7–300 / S7–400 station.
2. Download this basic configuration to the S7 station with HW Config.

Uploading:

3. Then select the “Options AS–i Slaves” tab
4. Click the “Upload to PG” button.

   An existing defined configuration is overwritten. Prior to accepting the configuration, you must confirm a warning.
5. Then change to the “Slave Configuration” tab to view the current actual configuration and, if necessary, edit it.

Tip:

To use this function simply for information despite an existing defined configuration in STEP 7, you can upload the actual configuration, check it and then click the “Cancel” button in the dialog.

❑

1.10 Transmission Rate on PROFIBUS

The DP/AS-i Link 20E supports the following transmission rates on PROFIBUS DP:

9.6 Kbps	19.2 Kbps	45.45 Kbps	93.75 Kbps	187.5 Kbps
500 Kbps	1.5 Mbps	3 Mbps	6 Mbps	12 Mbps

❑

Data Exchange Between the DP Master and AS-i Slave 2

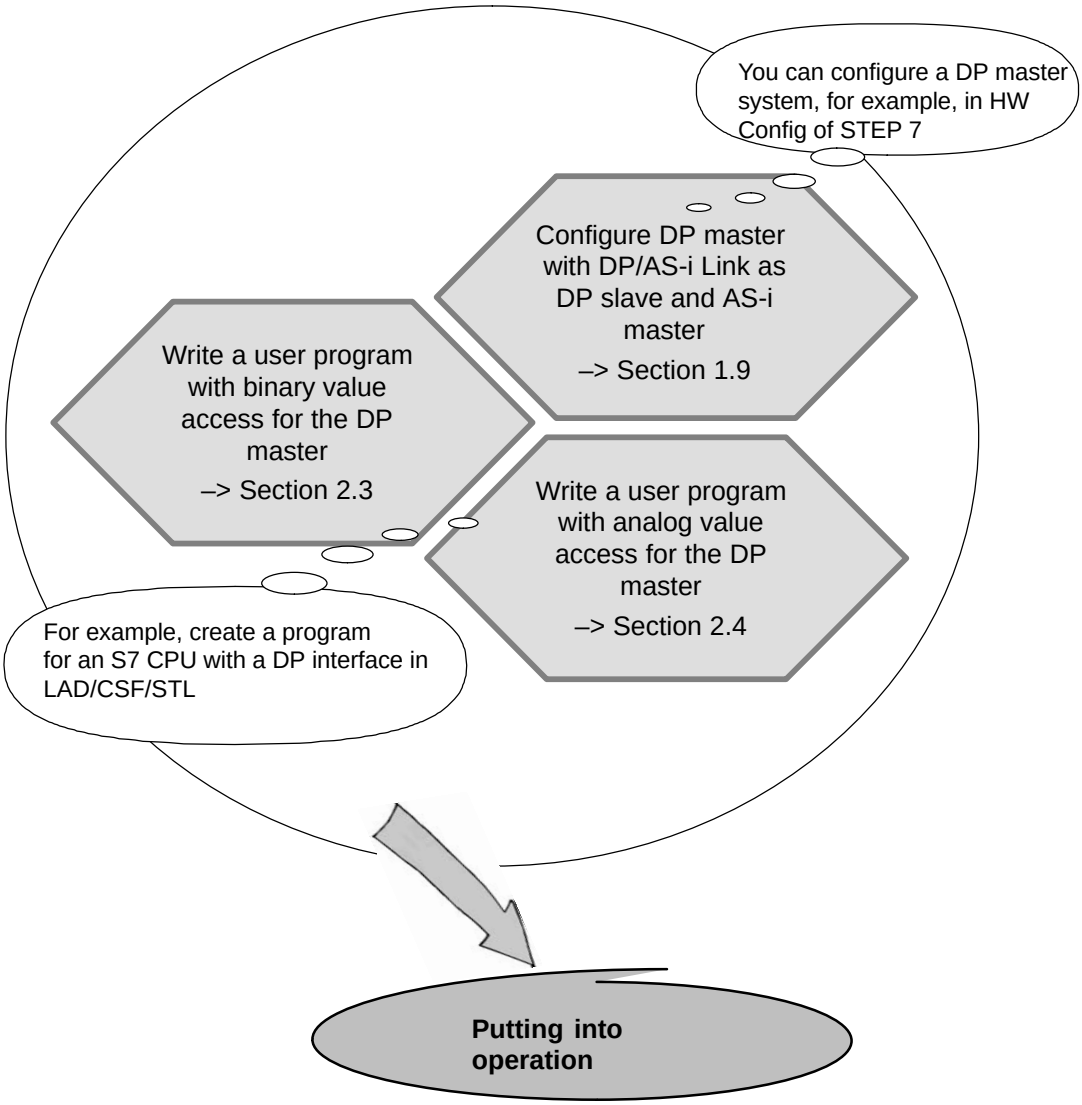
This chapter contains the information you require to access the AS-Interface from the DP master via the DP/AS-Interface Link 20E (DP/AS-i Link 20E)

The chapter explains the transfer of the following:

- Binary values using the cyclic DP services
- Analog values using the acyclic DP services

2.1 Preparation for Operation – an Overview

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



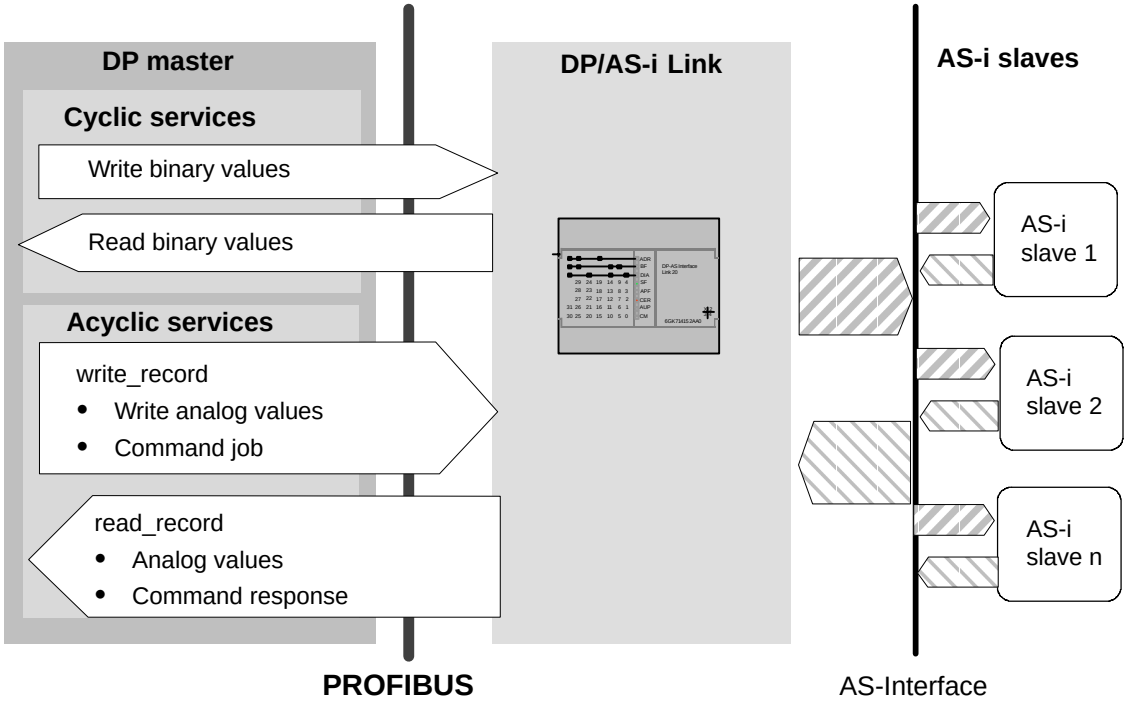
2.2 How the Interfaces Work

Accessing the AS-Interface via PROFIBUS DP

The DP master communicates with the AS-i slaves via the DP/AS-i Link 20E. The AS-i communication objects are mapped in one continuous data area for input data and one for output data in the DP master.

Due to its function, the DP/AS-i Link 20E must operate two interfaces:

1. **Interface to the DP master : PROFIBUS-DP**
2. **Interface to the AS-i slaves : AS-Interface**



Interface to DP master : PROFIBUS-DP

At the PROFIBUS end, the cyclic services and the acyclic services of PROFIBUS-DP V1 are used:

- Cyclic services

  The cyclic services are used to transfer binary values.

- Acyclic services of PROFIBUS-DP V1

  In the remainder of this description, these services are known as read_record and write_record. They are used for the following:

  – The transfer of analog values

  – To operate the command interface

2.3 Transferring AS-i Binary Values

Purpose

This section explains how the binary values of attached AS-i slaves can be accessed by the user program on the DP master.

Interface Between the DP Master and DP/AS-i Link 20E

Via the DP/AS-i Link 20E, the DP master accesses the binary inputs and outputs of the AS-i slaves in the **cyclic DP mode**. The inputs and outputs of the AS-i slaves are mapped in a continuous data area in the DP master.

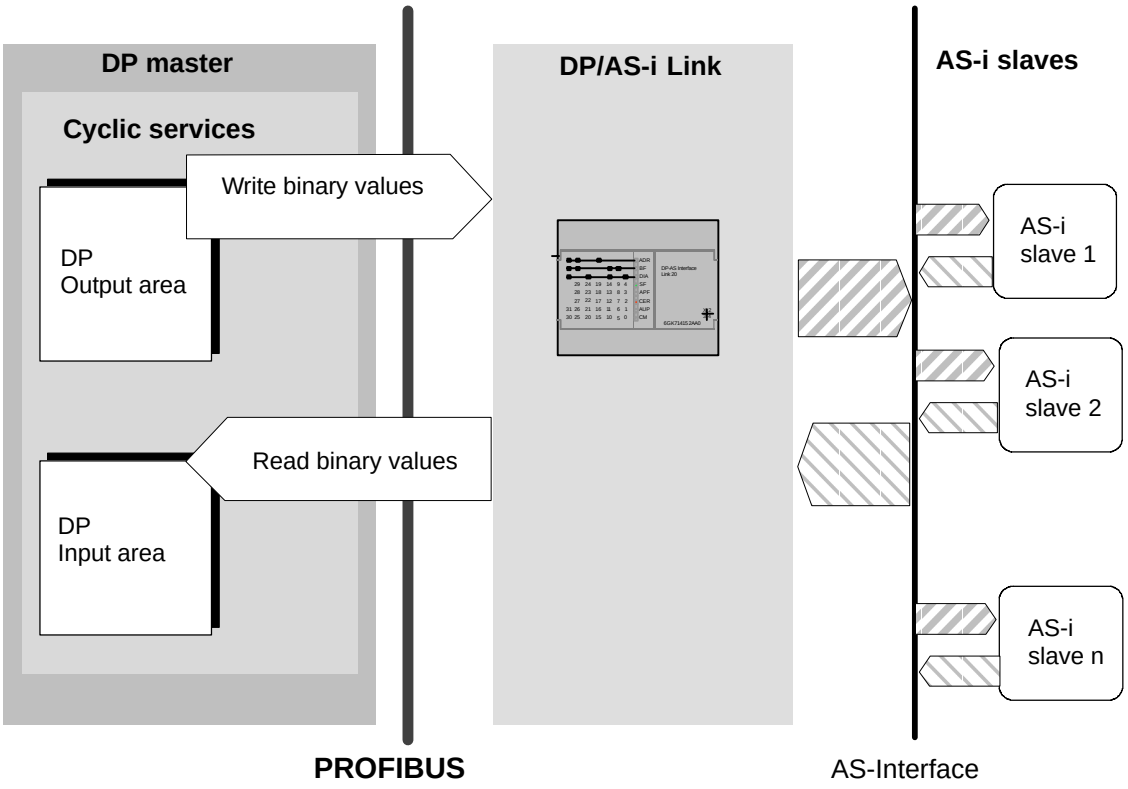


Figure 2-1

From the point of view of the PROFIBUS DP master, the DP/AS-i Link 20E occupies

- A maximum of 32 input bytes and a maximum of 32 output bytes

Addressing these bytes within the DP master (in the user program etc.) depends on the PROFIBUS DP master being used.

You will find examples of this below. For more detailed information, refer to /3/ and the manuals for your PROFIBUS DP master.

2.3.1 Addressing AS-i Slaves

Notice

The following information relating to addressing applies in this form only to button configuration (see Section 1.8) of the DP/AS-i Link 20E.

If you configure the AS-i slave using STEP 7, you must take into account the I/O addresses documented there (see Section 1.9.4).

Interface to the AS-i Slaves

The DP/AS-i Link 20E assigns four bits (a nibble) of input data and four bits of output data to every AS-i slave on the AS-i cable. The PROFIBUS DP master can access this data cyclically.

Addressing the AS-i Input or Output Data on the DP Master

In total, the maximum of 62 AS-i slaves occupy 32 bytes of input data and 32 bytes of output data (see table below). The start addresses of the input or output data depend on the configuration of the PROFIBUS DP master.

In SIMATIC S7, the address range selected for the input and output data area must always be identical.

Byte Number *)	**Bits 7–4**	**Bits 3–0**
m+0	Status Nibble **)	Slave 1 or 1A Bit 3 | Bit 2 | Bit 1 | Bit 0
m+1	Slave 2 or 2A	Slave 3 or 3A
m+2	Slave 4 or 4A	Slave 5 or 5A
m+3	Slave 6 or 6A	Slave 7 or 7A
m+4	Slave 8 or 8A	Slave 9 or 9A
m+5	Slave 10 or 10A	Slave 11 or 11A
m+6	Slave 12 or 12A	Slave 13 or 13A
m+7	Slave 14 or 14A	Slave 15 or 15A
m+8	Slave 16 or 16A	Slave 17 or 17A
m+9	Slave 18 or 18A	Slave 19 or 19A
m+10	Slave 20 or 20A	Slave 21 or 21A
m+11	Slave 22 or 22A	Slave 23 or 23A
m+12	Slave 24 or 24A	Slave 25 or 25A
m+13	Slave 26 or 26A	Slave 27 or 27A
m+14	Slave 28 or 28A	Slave 29 or 29A
m+15	Slave 30 or 30A	Slave 31 or 31A
m+16	reserved	Slave 1B
m+17	Slave 2B	Slave 3B
m+18	Slave 4B	Slave 5B
m+19	Slave 6B	Slave 7B
m+20	Slave 8B	Slave 9B

Byte Number *)	Bits 7–4	Bits 3–0
m+21	Slave 10B	Slave 11B
m+22	Slave 12B	Slave 13B
m+23	Slave 14B	Slave 15B
m+24	Slave 16B	Slave 17B
m+25	Slave 18B	Slave 19B
m+26	Slave 20B	Slave 21B
m+27	Slave 22B	Slave 23B
m+28	Slave 24B	Slave 25B
m+29	Slave 26B	Slave 27B
m+30	Slave 28B	Slave 29B
m+31	Slave 30 Bit 3 | Bit 2 | Bit 1 | Bit 0	Slave 31B Bit 3 | Bit 2 | Bit 1 | Bit 0

*)
m = start address of the input or output data on the DP master

**)
Bits 4–7 in the first byte of the **input** data are known as the status nibble; they are reserved for the command interface of the DP/AS-i Link 20E (see Section 3.1). Bits 4–7 in the first byte of the **output** data are also reserved and have no further significance.

Masking I/O Addresses

I/O addresses that are not used in the lower part of the table can be masked during DP configuration (for example in the STEP 7 configuration using the “Reserved Length” parameter (see Section 1.9.3).

Example:

You are not using any B slaves as AS-i slaves with binary inputs and the highest address of a standard slave is 20; this means that you can set the “Reserved Length” of the input data to 11.

Special Feature of AS-i Analog Slaves

If you use AS-i analog slaves complying with profile 7.3 /7.4, the following applies:

- The input nibbles of these AS-i slaves are set to the value “0” by the DP/AS-i Link 20E;
- The output nibbles of these AS-i slaves are ignored by the DP/AS-i Link 20E;

How to access AS-i analog slaves is described in Section 2.4.

Example of a Configuration

Figure 2-2 shows an example of the PROFIBUS DP master addressing four AS-i slaves. In the DP master, the start addresses m = 0 are used for the I/O data.

The bits relevant for the user program (existing AS-i slaves) are shown on a gray background. The bits shown on a white background are irrelevant for the user program since no AS-i slaves are assigned here.

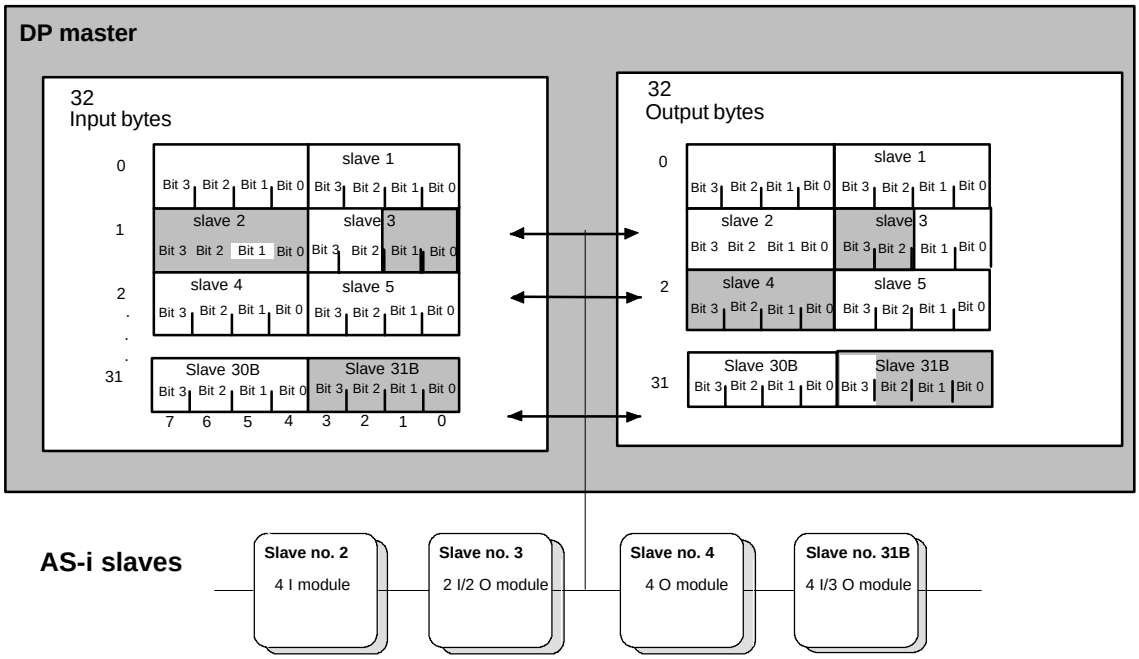
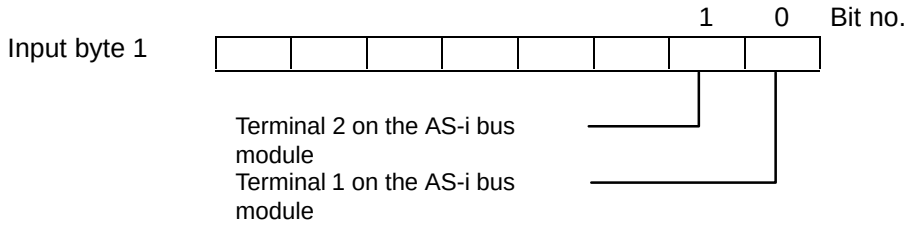
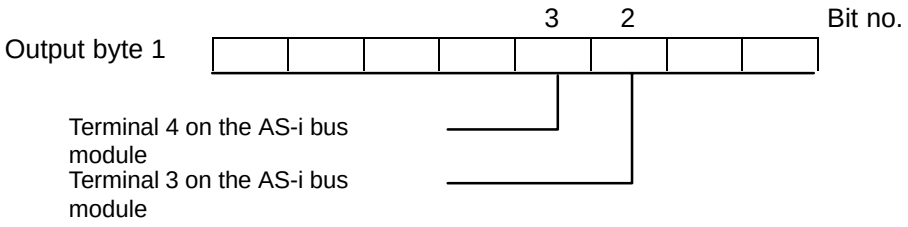


Figure 2-2

In the figure above, for example, the 2I/2O module (AS-i slave number 3 with two inputs and two outputs) occupies bits 0 and 1 in input byte 1 and bits 2 and 3 in output byte 1.

The assignment of the AS-i terminals of the AS-i bus modules to the data bits of the input/output bytes is shown below based on the example of slave number 3:




3
2
Bit no.
Output byte 1
Terminal 4 on the AS-i bus module
Terminal 3 on the AS-i bus module

2.3.2 Accessing AS-i Binary Data

The DP Master is the Decisive Factor

The way in which you access binary data of the AS-i slaves depends on the DP master you are using. Please refer to the relevant user documentation.

A SIMATIC S7 is the DP master

If you have configured the I/O addresses of the DP/AS-i Link 20E in the area of the process image, you can access the AS-i bit values using single bit commands.

Example (see also Figure 2-2):

```
A I 1.0        //Attachment 1 on AS–i module 3
= Q 1.3        //Attachment 4 on AS–i module 3
```

2.4 Transferring AS-i Analog Values

Purpose

This section explains how you can access analog values of attached AS-i slaves in the user program of the DP master.

Notice

The following explanations apply only to AS-i slaves that handle analog value transfer in compliance with the AS-i slave profile 7.3 or 7.4.

Analog value transfer in compliance with AS-i slave profile 7.1/7.2 is not supported by the DP/AS-i Link 20E. In this case, analog transfer must be implemented in your software.

Analog Interface Between the DP Master and DP/AS-i Link 20E

Analog values are read and written using the acyclic services of PROFIBUS-DP V1. In the user program of the DP master you use the read_record and write_record services.

You can operate up to 31 AS-i slaves each with up to 4 analog input or 4 analog output values. You access the analog values using up to 8 data records (data record numbers 140–147).

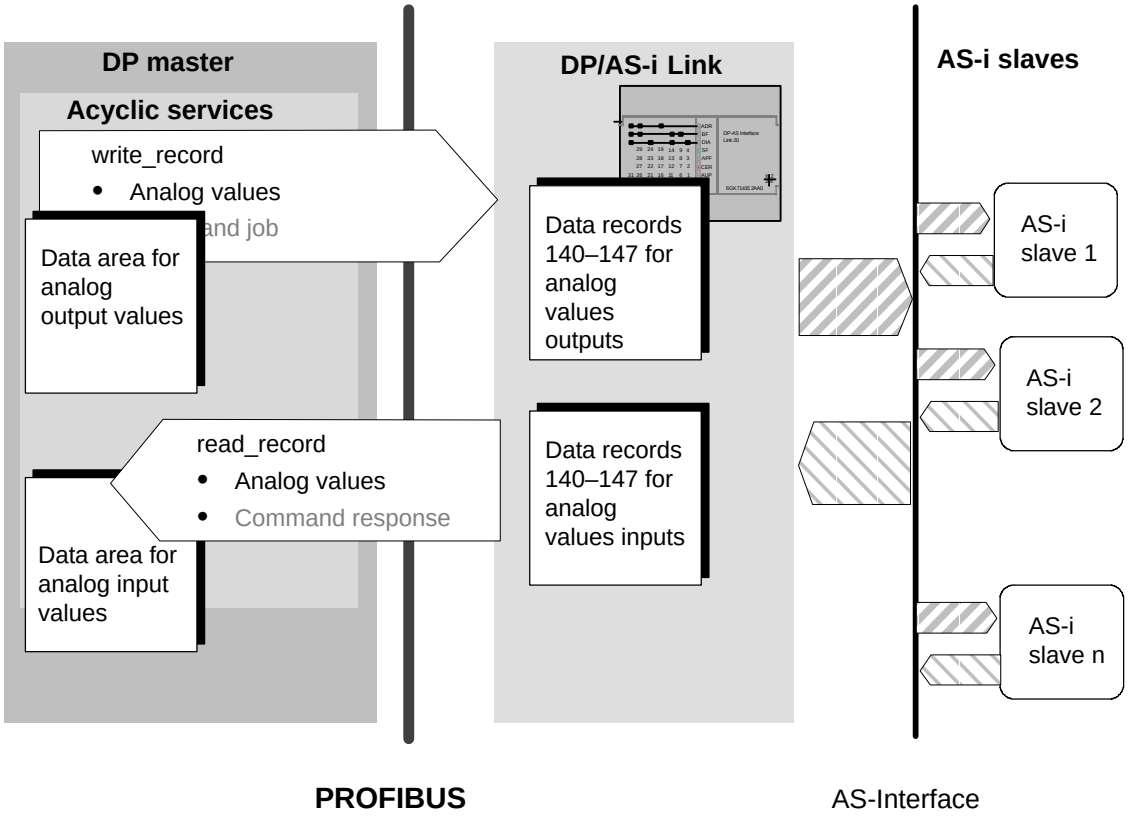

DP master
Acyclic services
write_record
Analog values
and job
Data area for analog output values
read_record
Analog values
Command response
Data area for analog input values
DP/AS-i Link
Data records 140–147 for analog values outputs
Data records 140–147 for analog values inputs
AS-i slaves
AS-i slave 1
AS-i slave 2
AS-i slave n
PROFIBUS
AS-Interface

Figure 2-3

2.4.1 Calling Acyclic Services

DP Master with Acyclic Services

The acyclic services complying with the DP standard DP-V1 for PROFIBUS-DP allow further jobs for sending output data to the DP slaves or for receiving input data from the DP slaves in addition to cyclic data transfer.

The acyclic services are used for the following with the DP/AS-i Link 20E:

- Reading/writing analog values
- Command interface (see Chapter 3)

Calls

Table 2-1

Call	With SIMATIC S7	With the DP programming interface
read_record	SFC 59	dpc*_read
write_record	SFC 58	dpc*_write

Call Parameters

Certain parameters must have values assigned to specify the job. The names of these parameters and the type of parameter setting can vary depending on the type of the DP master.

The following table provides you with an overview of the parameters according to the DP-V1 specification and shows examples of how they are mapped in the parameter assignment of a user program for a SIMATIC S7 CPU and a user program for a PC/programming device in which the SIMATIC NET programming interface is used.

Table 2-2 Parameters for Sending/Receiving

DP-V1	SIMATIC S7 (SFC 58/59)	For PC: DP programming interface (dpc*_read/write)	Meaning
PROFIBUS address	LADDR (the start address of the cyclic input bytes of the DP/AS-i Link must be specified (see also Section 1.9). The S7 CPU calculates the PROFIBUS address from this information.)	C_Ref	PROFIBUS address of the DP/AS-i Link (DP slave)
	IOID The following fixed value must be entered: B#16#54	–	Fixed value
Slot_number	Is calculated from LADDR; Not an SFC parameter	Slot_number	With DP/AS-i Link: Any value
Index	RECNUM	Index	Data record number (140–147; see Table 2-3)
Length	RECORD Referenced using ANY pointer	Length_s	Length of the input/output data area
Data	RECORD Referenced using ANY pointer	Data_s	Address of the input/output data area
	RET_VAL BUSY		Return parameter for execution check

You will find sample programs for SIMATIC S7 in Section 2.4.3

2.4.2 Programming

Job Parameters

Make the parameter settings for the read_record and write_record jobs as described in Section 2.4.1. Access to the analog values is controlled by the following parameters:

- Index:
  Specifies the data record number in which the analog values are stored on the DP/AS-i Link 20E. How the available data record numbers 140 to 147 are used is explained below.
- Length:
  Specifies the length of the input/output data area; the specified length must be adapted to the data record being used and the address area of the analog slaves. This is explained in greater detail and with examples below.
- Data:
  Specifies the address of the input/output data area in which your user program accesses the analog values or makes the analog values available.

You will find sample calls at the end of this chapter.

Data Consistency

In terms of one AS-i slave, the analog values transferred to the DP master are always consistent.

Mapping the Analog Values in the Data Records

To access analog values, you can select one of the data records 140 to 147. The data records differ from each other in their length. This allows you to optimize the data area to be reserved in your application if you are using less AS-i analog slaves than the maximum number supported by the interface.

An 8-byte area is used for each slave address to manage 4 analog channels.

Remember that slave address 31 is not used in data record 140.

Table 1-1 below shows which address area in the selectable data records the analog values of which AS-i slave are transferred to. How the analog values of an analog slave are mapped in the address areas is shown in Table 2-4.

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

Following the tables, you will find notes explaining how to read the tables.

Table 2-3 Accessing Analog Values using Data Records

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

Table 2-4 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

Examples:

1. Configuration: Analog slaves have the AS-i addresses 1–6

   You use data record 140 and specify 48 as the data record length.

2. Configuration: 1 analog slave with AS-i address 7 is used

   You use data record 141 and specify 24 as the data record length.

3. Configuration: The entire address range for 31 analog slaves is used

   You use data record 140 and specify 224 as the data record length. This covers analog slaves 1–28.

   For the other analog slaves 29–31, you use data record 147 in a second job and specify 24 as the data record length.

4. Configuration: Analog slaves are in the address range 29–31

   You use data record 147 and specify 24 as the data record length.

Representation of the Analog Values

According to slave profile 7.3 or 7.4, the analog values are interpreted as 16-bit values in two’s compliment

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

Special Situations in Analog Value Transfer

- In the input direction (read_record), the DP/AS-i Link 20E supplies the value 7FFFh in the following situations:
  - The AS-i slave does not exist, has failed, or is not an analog slave complying with profile 7.3 or 7.4.
  - The channel number is not supported by the analog slave.
  - The analog slave signals “Value Invalid”.
- In the input direction (read_record) the DP/AS-i Link 20E supplies the value 0h when the analog slave supplies transparent data complying with profile 7.3 (ext. ID2 code, Bit 2=1) and when
  - This analog slave has failed
  - This analog slave signals “Value Invalid”.
- In the output direction (write_record) the DP/AS-i Link 20E behaves as follows:
  - In the CLEAR status of the DP master (corresponds to the STOP state of a PLC), the DP/AS-i Link 20E stops transfer of the analog output values. How the analog slave reacts depends on the particular device.
  - When the DP/AS-i Link 20E starts up, all analog output values are set to 7FFFh. This value is, however, only sent by the DP/AS-i Link 20E after the first data record transfer for the relevant analog slaves.

Note

In SIMATIC S7, the number of simultaneously active read_record and write_record jobs is restricted. The maximum permitted number depends on the particular S7 CPU.

If more than the maximum number of jobs are triggered, they are terminated with the error 80C3h (temporary lack of resources). The rejected job must then be repeated.

2.4.3 Programming Examples

Example of Programming for a SIMATIC S7

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

Table 2-5

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

      CALL   SFC   59                        //RD_REC
      REQ    :=TRUE
      IOID   :=B#16#54                       //Fixed value
      LADDR  :=W#16#120                      //Start of cyclic input data
      RECNUM :=B#16#8D                       //DS141 (slave 5 and following)
      RET_VAL:=MW130                         //Return parameter
      BUSY   :=M129.0                        //Return parameter
      RECORD :=P#DB40.DBX 0.0 BYTE 32        //Receive buffer (slaves 5...8)


      CALL   SFC   58                        //WR_REC
      REQ    :=TRUE
      IOID   :=B#16#54                       //Fixed value
      LADDR  :=W#16#120                      //Start of cyclic input data
      RECNUM :=B#16#8E                       //DS142 (slave 9 and following)
      RECORD :=P#DB40.DBX 32.0 BYTE 32       //Send buffer (slaves 9...12)
      RET_VAL:=MW132                         //Return parameter
      BUSY   :=M129.1                        //Return parameter
```

❑

2.5 PROFIBUS DP Control Commands

The DP/AS-i Link 20E supports all the control commands defined in the PROFIBUS DP standard:

Table 2-6

Control command	Effect
FREEZE	The values of the binary input data of the AS-i slaves are frozen by the DP/AS-i Link 20E. The DP/AS-i Link 20E updates this data once with each further FREEZE.
UNFREEZE	The FREEZE command is canceled.
SYNC	The values of the binary output data are frozen by the DP/AS-i Link 20E. The DP/AS-Interface Link 20 updates this data once with each further SYNC.
UNSYNC	The SYNC command is canceled.
CLEAR	The values of the binary output data passed on by the DP/AS-i Link 20E to the AS-i slaves are set to ’0’ by the DP/AS-i Link 20E.

❑

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3 Using the Command Interface

Via the command interface, you can control the response of the AS-i master completely from within your user program.

This chapter contains the information you require to access the command interface of the DP/AS-Interface Link 20E from your DP master.

Apart from a detailed description of the commands, the two interface variants are explained in detail as follows:

- The command interface of the DP/AS-Interface Link 20E
- The command interface with SIMATIC S7

3.1 Command Interface of the DP/AS-Interface Link 20E

Note

A special function block (FC ASI_3422) is available for the AS-i commands in a SIMATIC S7 DP master. This FC handles the command protocol described below independently (see Section 3.2).

You will find FC ASI_3422 in the programming example on the diskette supplied with the printed version of this manual.

Significance and Functionality

Via the command interface, you can control the response of the AS-i master completely from within your user program.

AS-i commands are read and written using the acyclic services of PROFIBUS-DP V1. In the user program on the DP master, you use the services read_record and write_record (data record 2).

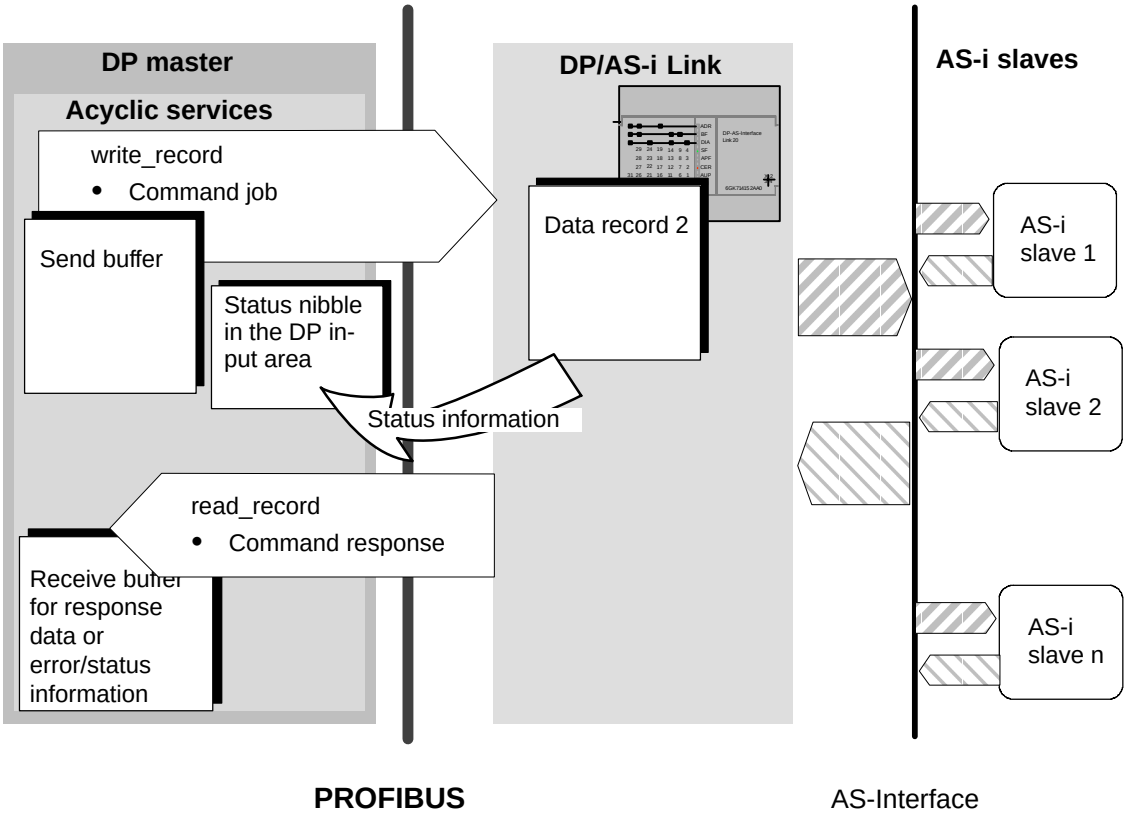

Figure 3-1

Job Parameters

Set the parameters for the read_record and write_record jobs as described in Section 2.4.1. Sending the commands is controlled by the following parameters:

- Index:
  Specifies the data record number = 2
- Length:
  - The length of the data sent (with write_record) depends on the command;
  - The length of the data received (with read_record) is indicated by the DP/AS-i Link 20E using the status nibble.

Commands in the User Program

To work with commands, include the following in your user program:

1. Specify the command call in a send buffer in the user program.
2. Send this job with write_record (record 2) to the DP/AS-i Link 20E.
3. Following this, query the status of command processing in the input area for binary values (cyclic services – see Section 2.1). The status information is entered in bits 4 to 7 in the reserved first byte of the DP input area (status nibble).
4. Various reactions are possible depending on the result of the status evaluation as shown in the following flowchart (for more detailed information on the meaning of the status nibble, please refer to Table 3-1).

   To complete command processing, you must always sent a read_record job (data record 2) either to obtain further status information or to receive response data.

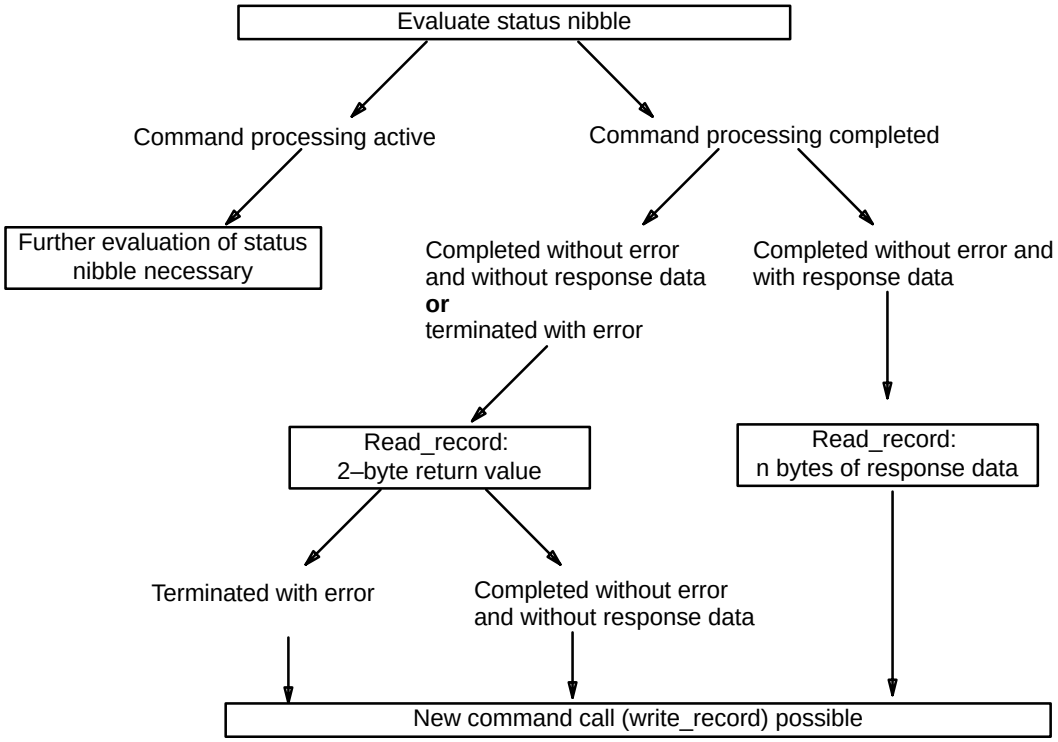

Figure 3-2

Table 3-1 Coding of the Status Nibble

Status nibble (1st byte of the digital input data)				**Meaning**
Bit 7	Bit 6	Bit 5	Bit 4	
1	0	0	0	Startup ID 1: Following a startup/restart of the AS-i master, the status nibble changes between the values 1000_B and 1110_B. It is possible to trigger a command with the user program
1	1	1	0	Startup ID 2: Following a startup/restart of the AS-i master, the status nibble changes between the values 1000_B and 1110_B. It is possible to trigger a command with the user program
1	1	0	0	Reserved for SIMATIC S7 application FC “ASI_3422” It is possible to trigger a command with the user program
0	0	1	0	Command processing active It is not possible to trigger a command with the user program

Table 3-1 Coding of the Status Nibble, continued

Status nibble (1st byte of the digital input data)				**Meaning**
0	0	0	1	Command processing is completed. With an asynchronous read job, a **2-byte** return value can be fetched by the AS-i master. Two situations must be distinguished: The return value is 0: A command without response data was completed without error The return value is a value **not equal to 0**: The command was terminated **with error**.(See Table 3-3) A new command can be triggered by the user program
0	0	1	1	Command processing was completed without error. Using an asynchronous read job, **1 byte** of response data can be fetched by the AS-i master. A new command can be triggered by the user program
0	1	0	1	Command processing was completed without error. Using an asynchronous read job, **4 bytes** of response data can be fetched by the AS-i master. A new command can be triggered by the user program
0	1	1	1	Command processing was completed without error. Using an asynchronous read job, **14 bytes** of response data can be fetched by the AS-i master. A new command can be triggered by the user program
1	0	0	1	Command processing was completed without error. Using an asynchronous read job, **16 bytes** of response data can be fetched by the AS-i master. A new command can be triggered by the user program
1	0	1	1	Command processing was completed without error. Using an asynchronous read job, **32 bytes** of response data can be fetched by the AS-i master. A new command can be triggered by the user program
1	1	0	1	Command processing was completed without error. Using an asynchronous read job, **56 bytes** of response data can be fetched by the AS-i master. A new command can be triggered by the user program
1	1	1	1	Command processing was completed without error. Using an asynchronous read job, **221 bytes** of response data can be fetched by the AS-i master. A new command can be triggered by the user program
0	1	0	0	Job processing is completed. The response data or the return value of the previous job have already been read by the user. A new command can be triggered by the user program

Example:

Based on the following table, you can see how the display in the status nibble changes due to the device state and the command processing in the user program.

Table 3-2

Action	Reaction in the Status Nibble
1. AS-i power supply switched on for the DP/AS-i Link 20E.	1110_B....1000_B.....1110_B....
2. The user program transfers a command (for example write_parameter) with an asynchronous write job to the DP/AS-i Link 20E.	0010_B (briefly, depending on the command)
3. The AS-i master completes the command. The return value can be read by the user program.	0001_B
4. The user program reads a 2-byte return value using an asynchronous read job.	0100_B
5. ....further program execution ...	....
6. The user program transfers a command (for example, Get_LPS, Get_LAS, Get_LDS, Get_Flags) with an asynchronous write access to the DP/AS–i Link 20E.	0010_B (briefly, depending on the command)
7. The AS-i master completes the command without error. The response data can be read by the user program	1011_B
8. The user program reads 32 bytes of response data with an asynchronous read job.	0100_B

Return Value

Error free processing is encoded in the return value of the response buffer. There is an error when value in the status nibble is “completed without error and without response data or terminated with error” (Coding: 0001_H).

Table 3-3 Return Value in the Response Buffer

STATUS	Meaning
0000_H	**Job completed without error**
8381H	The AS-i slave address is incorrect
8382H	The AS-i slave is not activated (not in LAS).
8383H	Error on AS-Interface.
8384H	Command not permitted in the current status of the AS-i master.
8385H	An AS-i slave with address 0 exists.
8386H	The AS-i slave has illegal configuration data (I/O or ID codes).
$83A1_H$	The addressed AS-i slave was not found on the AS-Interface.
$83A2_H$	An AS-i slave with address 0 exists.

Table 3-3 Return Value in the Response Buffer, continued

STATUS	Meaning
83A3$_H$	An AS-i slave with the new address already exists on the AS-Interface.
83A4$_H$	The AS-i slave address cannot be deleted.
83A5$_H$	The AS-i slave address cannot be set.
83A6$_H$	The AS-i slave address cannot be stored permanently.
83A7$_H$	Error reading the extended ID1 code.
83A8$_H$	The target address is not plausible (for example a B slave address was used for a standard slave).
83B1$_H$	A length error has occurred transferring a string according to profile 7.4.
83B2$_H$	A protocol error has occurred transferring a string according to profile 7.4.
83F8$_H$	The job number or the job parameter is unknown.
83F9$_H$	The AS-i master has detected an EEPROM error.

Note

Errors that occur during processing of the acyclic services and that are indicated by call parameters such as “Return Value” can be found in the documentation of the relevant programming interface.

3.2 Command Interface for SIMATIC S7

Purpose

In SIMATIC S7, a convenient command interface is available with FC ASI_3422.

By calling FC ASI_3422, you can handle both the transfer of the command and the acceptance of the response data. After it has been called, FC ASI_3422 instigates and handles the write_record and read_record calls independently.

Call Interface

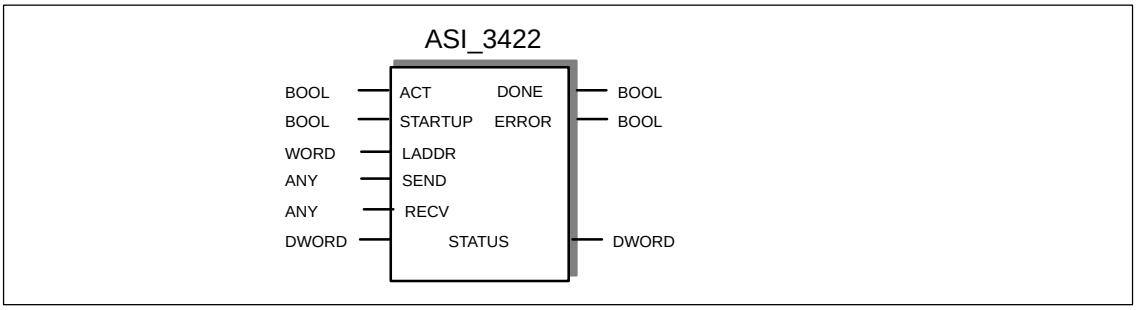

Table 3-4 Formal Parameters

Name	Para Type	Data Type	Memory Area	Remarks
ACT	I	BOOL	I,Q,M,D,L,constant	As long as ACT = 1, command processing is started provided no other call is being processed.
STARTUP	I	BOOL	I,Q,M,D,L,constant	A CPU startup is indicated to the FC by STARTUP = 1. After the function is run through the first time, STARTUP must be reset by the user.
LADDR	I	WORD	I,Q,M,D,L,constant	Start address of the DP/AS-i Link 20E in the S7 address area. The module start address is specified during STEP 7 configuration.
SEND	I	ANY	I,Q,M,D,L	Send buffer The parameter references a memory area in which the command must be specified by the user. for example: P#DB20.DBX 20.0 byte 10

Table 3-4 Formal Parameters, continued

Name	Para Type	Data Type	Memory Area	Remarks
RECV	I	ANY	I,Q,M,D,L	Receive buffer This buffer is only relevant for commands that supply response data. The parameter references a memory area in which the command response is stored. The length information in the ANY pointer specified here is irrelevant. The FC itself obtains the length of the response data. for example: P#DB30.DBX 20.0 byte 1
DONE	Q	BOOL	Q,M,D,L	DONE = 1 signals 'job completed without error'.
ERROR	Q	BOOL	Q,M,D,L	ERROR = 1 signals 'job terminated with error'.
STATUS	I/Q	DWORD	M,D	1st word: Job status / error code (see Table 3-5); For 'job terminated with error', an error code is generated that describes the error in greater detail. 2nd word: Required by the FC for internal purposes and must **not** be modified. Note: For FC calls to different DP/AS-i Link 20E modules, different double words must be used for the STATUS parameter.

Commands in the User Program

To work with commands, you require the following in your user program:

1. In the warm restart branch of your S7 user program, call FC ASI_3422 once with the parameter value STARTUP = TRUE.
2. Specify the command call in a send buffer in the user program. You transfer this send buffer with the SEND call parameter.
3. Depending on the command type you will also require a response buffer. You transfer this response buffer with the RECV call parameter. For status information, the response buffer is **not** required for this FC interface.
4. Activate the job with the parameter ACT=1
5. You then query the parameters DONE, ERROR and STATUS. For handling these parameters in the user program, note the signal sequence of the parameters explained below.

The diskette supplied with this manual contains sample programs.

Points to Note

- If you use the FC interface FC ASI_3422 for command processing, you must not send other commands via the read_record and write_record with data record number 2 at the same time.
- You must use version 2.0 or higher of the FC ASI_3422
- FC ASI_3422 is not reentrant! FC calls must not be programmed in priority classes that can interrupt each other (for example by a call in OB1 **and** in OB35).
- In SIMATIC S7, the number of simultaneously active read_record and write_record jobs is restricted. The maximum number of jobs depends on the S7 CPU.

  If more jobs are triggered, these are terminated with the error 80C3h (temporary lack of resources). The rejected job must then be repeated.

Signal Sequence of the Formal Parameters ACT, DONE, ERROR and STATUS

A command call is started by ACT = 1. During the processing of the job, the first word of STATUS has the value 8181_H. This indicates that a job is being processed. On completion of the job, the user is informed of the result in the DONE or ERROR parameters.

If no error occurred, DONE is set. In jobs involving response data from the DP/AS-i Link 20E, these are available in the receive buffer specified for RECV. In this case, 0000_H is entered in the first word of STATUS.

If an error occurred, ERROR is set. In this case, no receive data are available from the DP/AS-i Link 20E for jobs with response data. To identify the error in greater detail, an error code is entered in the first word of STATUS.

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

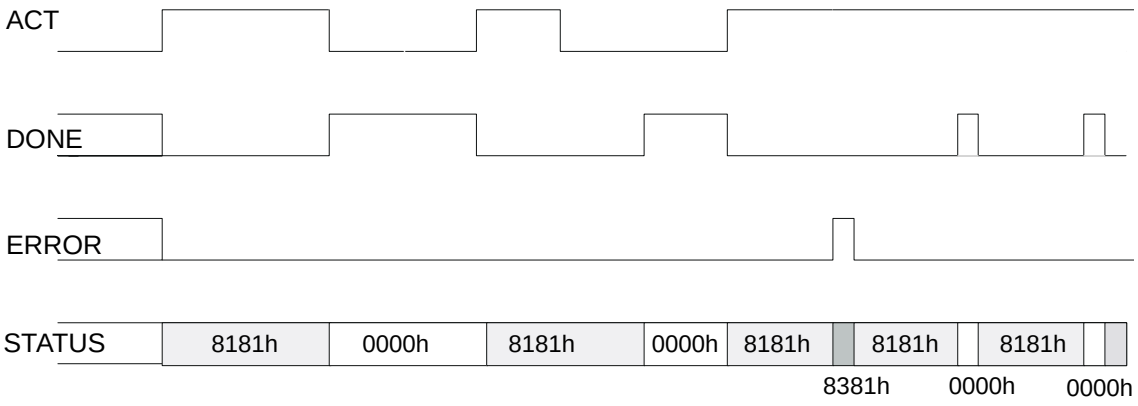

Figure 3-3

Table 3-5 Error Coding

DONE	ERROR	STATUS	Meaning
1	0	0000_H	**Job completed without error**
0	1	8090_H	Address in LADDR invalid
0	1	8092_H	A type other than BYTE is specified in the ANY reference.
0	1	8093_H	This SFC is not permitted for the module selected with LADDR and IOID. (S7-300 modules are permitted for S7-300, S7-400 modules for S7-400, S7-DP modules for S7-300 and S7-400.)
0	1	$80A0_H$	Negative acknowledgment when reading from AS-i master.
0	1	$80A1_H$	Negative acknowledgment when writing to AS-i master
0	1	$80A2_H$	DP protocol error at Layer 2
0	1	$80A3_H$	DP protocol error involving user interface/user
0	1	$80A4_H$	Communication problems on K bus
0	1	$80B0_H$	AS-i master does not recognize the data record
0	1	$80B1_H$	Specified data record length incorrect
0	1	$80B2_H$	The configured slot is not in use.
0	1	$80B3_H$	Actual module type does not match the expected module type in SDB1
0	1	$80C0_H$	Data record cannot be read
0	1	$80C1_H$	The specified data record is currently being processed
0	1	$80C2_H$	There is a job pileup
0	1	$80C3_H$	Resource (memory) in use
0	1	$80C4_H$	Communication error
0	1	$80C5_H$	Distributed I/Os not available
0	1	$80C6_H$	Data record transfer aborted due to priority class abort (warm restart or background) of the distributed I/Os.
0	0	8181_H	**Job active (no error)**
0	1	8182_H	ID following warm restart (STARTUP=TRUE)
0	1	8184_H	Data type of the RECV formal parameter illegal
0	1	8381_H	The AS-i slave address is incorrect
0	1	8382_H	The AS-i slave is not activated (not in LAS).
0	1	8383_H	Error on the AS-Interface
0	1	8384_H	Command not permitted in the current status of the AS-i master.
0	1	8385_H	An AS-i slave with address 0 exists.
		8386_H	The AS-i slave has illegal configuration data (I/O or ID codes).
0	1	$83A1_H$	The addressed AS-i slave was not found on the AS-Interface.
0	1	$83A2_H$	An AS-i slave with address 0 exists.

Table 3-5 Error Coding, continued

DONE	ERROR	STATUS	Meaning
0	1	83A3H	An AS-i slave with the new address already exists on the AS-Interface.
0	1	83A4H	The AS-i slave address cannot be deleted.
0	1	83A5H	The AS-i slave address cannot be set.
0	1	83A6H	The AS-i slave address cannot be stored permanently.
0	1	83A7H	Error reading the extended ID1 code.
0	1	83A8H	The target address is not plausible (for example a B slave address was used for a standard slave).
0	1	83B1H	A length error has occurred transferring a string according to profile 7.4.
0	1	83B2H	A protocol error has occurred transferring a string according to profile 7.4.
0	1	83F8H	The job number or the job parameter is unknown.
0	1	83F9H	The AS-i master has detected an EEPROM error.
0	1	8F22H	Area length area reading a parameter
		8F23H	Area length error writing a parameter This error code indicates that a parameter is entirely or partly outside the address area or that the length of a bit array of an ANY parameter cannot be divided by 8.
0	1	8F24H	Area error reading a parameter
		8F25H	Area error writing a parameter This error codes indicates that a parameter is located in an area that is illegal for a system function.
0	1	8F28H	Alignment error reading a parameter
		8F29H	Alignment error writing a parameter This error code indicates that the reference to a parameter is a bit address other than 0.
0	1	8F30H	The parameter is in the write-protected global DB
		8F31H	The parameter is in the write-protected instance DB This error code indicates that a parameter is located in a write-protected data block.
0	1	8F32H	The DB number in the parameter is too high
0	1	8F3AH	The parameter contains the number of a DB that is not loaded
0	1	8F42H	An access error has occurred while the system attempted to read out a parameter from the peripheral area of the inputs.
0	1	8F43H	An access error occurred while the system was attempting to write a parameter to the peripheral area of the outputs

Table 3-5 Error Coding, continued

DONE	ERROR	STATUS	Meaning
0	1	$8F44_H$	This parameter code indicates that read access to a parameter was denied
0	1	$8F45_H$	This error code indicates that write access to a parameter was denied
0	1	$8F7F_H$	Internal error

3.3 Description of the AS-i Slave Commands

Overview

This section describes the command calls that can be sent by the DP master to the DP/AS-i Link 20E. With these command calls, the DP/AS-i Link 20E provides the complete functionality of the master profile M1e of the AS-i master specification. In addition to this, the DP/AS-i Link 20E can be configured completely by the DP master using command calls.

The use of the jobs is described in the individual descriptions of the jobs themselves, in the PICS appendix and in the detailed explanations in /1/ and /2/.

The available commands are listed in the table below:

Table 3-6 AS-i Slave Commands

Name	Parameter	Return	Coding
Set_Permanent_Parameter –> described in Section 3.3.1	Slave address, parameter		00_H
Get_Permanent_Parameter –> described in Section 3.3.2	Slave address	Parameter	01_H
Write_Parameter –> described in Section 3.3.3	Slave address, parameter	Parameter echo (optional)	02_H
Read_Parameter –> described in Section 3.3.4	Slave address	Parameter value	03_H
Store_Actual_Parameters –> described in section 3.3.5			04_H
Set_Extended_Permanent_Configuration –> described in section 3.3.6	Slave address		25_H
Get_Extended_Permanent_Configuration –> described in section 3.3.7	Slave address, configuration	specified configuration	26_H
Store_Actual_Configuration –> described in Section 3.3.8			07_H
Get_Extended_Actual_Configuration –> described in section 3.3.9	Slave address	actual configuration	28_H
Set_LPS –> described in section 3.3.10	LPS		29_H
Set_Offline_Mode –> described in section 3.3.11	Mode		$0A_H$
Select_Autoprogramming –> described in section 3.3.12	Mode		$0B_H$
Set_operation_mode –> described in section 3.3.13	Mode		$0C_H$

Table 3-6 AS-i Slave Commands, continued

Name	Parameter	Return	Coding
Change_AS-i_Slave_Address –> described in Section 3.3.14	Address 1, Address2		$0D_H$
Get_AS-i_Slave_Status –> described in Section 3.3.15	Slave address	Error record of the AS-i slave	$0F_H$
Get_LPS, Get_LAS, Get_LDS, Get_Flags –> described in section 3.3.16	None	LDS, LAS, LPS, flags	30_H
Get_Extended_Total_Configuration –> described in section 3.3.17		Actual configuration, current parameters, LAS, flags	39_H
Store_Extended_Total_Configuration –> described in section 3.3.18	Total configuration		$3A_H$
Write_Extended_Parameter_List –> described in Section 3.3.19	Parameter list		$3C_H$
Read_Extended_Parameter_Echo_List –> described in section 3.3.20		Parameter echo list	33_H
Read_Version_ID –> described in section 3.3.21		Versions – String	14_H
Read_AS-i_Slave_ID –> described in section 3.3.22	Slave address	ID – Code	17_H
Read_AS-i_Slave_Extended_ID1 –> described in section 3.3.23	Slave address	Extended ID1 code	37_H
Write_AS-i_Slave_Extended_ID1 –> described in section 3.3.24	Extended ID1 code		$3F_H$
Read_AS-i_Slave_Extended_ID2 –> described in section 3.3.25	Slave address	Extended ID2 code	38_H
Read_AS-i_Slave_I/O –> described in section 3.3.26	Slave address	I/O configuration	18_H
Get_LPF –> described in section 3.3.27		LPF	$3E_H$
Write_AS-i_Slave_Parameter_String –> described in section 3.3.28	Slave address, parameter string		40_H
Read_AS-i_Slave_Parameter_String –> described in section 3.3.29	Slave address	Parameter string	41_H
Read_AS-i_Slave_ID_String –> described in section 3.3.30	Slave address	ID string	42_H
Read_AS-i_Slave_Diagnostic_String –> described in section 3.3.31	Slave address	Diagnostic string	43_H

General Structure of the Send Buffer

The basic structure of the send buffer for commands is shown below. The bytes only relevant with certain commands are shown on a gray background.

Byte	Meaning
q+0	Command number
q+1	Job data
q+...	Job data

q = start address of the send buffer on the DP master

General Structure of the Receive Buffer

The basic structure of the response buffer is shown below. The bytes only relevant with certain commands are shown on a gray background.

Byte	Meaning
n+0	Response data
n+1	Response data
n+...	Response data

n = start address of the response buffer on the DP master

General Structure of the AS-i Slave Address

If an AS-i slave is addressed in a command or in a response, the address is structured as shown below:

Bit 7	Bit 6	Bit 5	Bit 4				Bit 0
		S bit	**Slave address**				

Where the S(elect) bit for selecting the slave type is specified as follows:

- S bit = 0
  Standard AS-i slave or AS-i slave with extended addressing mode in address area A
- S bit = 1
  AS-i slave with extended addressing mode in address area B

3.3.1 Set_Permanent_Parameter

Purpose

With this call, a parameter value for the specified AS-i slave is configured on the DP/AS-i Link 20E. The value is stored permanently in the EEPROM of the DP/AS-i Link 20E.

The configured parameter is **not** transferred immediately by the DP/AS-i Link 20E 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 DP/AS-i Link 20E.

This call is not permitted for AS-i slaves that comply with the AS-i slave standard profile 7.4. For these AS-i slaves, the AS-i master handles the AS-i slave parameter assignment itself. In this case, the configured parameters are always set to F_H.

Note

If you use CPUs from the SIMATIC S7 system as the PROFIBUS DP master, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the DP/AS-i Link 20E during the DP startup. Use of the call described here is then generally unnecessary.

Structure of the Job Data in the Send Buffer

Byte	Meaning	
	Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
0	Command number: 00_H	
1	Slave address	
2	irrelevant	Parameter

3.3.2 Get_Permanent_Parameter

Purpose

With this call, a slave-specific parameter value stored on the EEPROM of the DP/AS-i Link 20E is read.

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 01_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning	
	Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
0	reserved	configured parameters

3.3.3 Write_Parameter

Purpose of the Command

The AS-i slave parameter value transferred with the command is passed on to the addressed AS-i slave.

The parameter is stored on the DP/AS-i Link 20E only **temporarily** and is not entered as a configured parameter in the EEPROM!

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

This call is not permitted for AS-i slaves that comply with the AS-i slave standard profile 7.4. For these slaves, the AS-i master handles the AS-i slave parameter assignment itself.

Structure of the Job Data in the Send Buffer

Byte	Meaning			
	Bit 7	**Bit 4**	**Bit 3**	**Bit 0**
0	Command number: 02_H			
1	Slave address			
2	irrelevant		Parameter	

Structure of the Response Data in the Receive Buffer

Byte	Meaning			
	Bit 7	**Bit 4**	**Bit 3**	**Bit 0**
0	reserved		Parameter echo	

3.3.4 Read_Parameter

Purpose

This call returns the current parameter value (actual parameter) of an AS-i slave sent by the DP/AS-i Link 20E.

This value must not be confused with the parameter echo that is supplied by the AS-i slave as a response to the write_parameter job.

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 03_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning	
	Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
0	reserved	Parameter

3.3.5 Store_Actual_Parameters

Purpose

With this call, the configured parameters stored on the EEPROM are overwritten with the current, permanently stored (actual) parameters; in other words, the parameters of all the AS-i slaves are configured.
For AS-i slaves that comply with the AS-i slave standard profile 7.4, the AS-i master manages the AS-i slave parameter assignment itself. The configured parameters for these AS-i slaves always have the value F_H.

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 04_H

3.3.6 Set_Extended_Permanent_Configuration

Purpose

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

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

The configuration data are stored permanently on the EEPROM of the DP/AS-i Link 20E and are used as the expected configuration by the AS-i master in the protected mode. The configuration data are 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 command 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 PROFIBUS DP master, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the DP/AS-i Link 20E during the DP startup. Use of the call described here is then generally unnecessary.

Structure of the Job Data in the Send Buffer

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

3.3.7 Get_Extended_Permanent_Configuration

Purpose

This call reads the following configuration data (configured data) of an addressed AS-i slave stored on the EEPROM of the AS-i master.

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

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

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number 26_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning	
	Bit 7 Bit 4	**Bit 3 Bit 0**
0	ID code	I/O configuration
1	Extended ID1 code	Extended ID2 code
2	reserved	
3	reserved	

3.3.8 Store_Actual_Configuration

Purpose of the Command

With this call, the (actual) configuration data (I/O configuration, ID code, extended ID1 code and extended ID2 code) of all AS-i slaves are stored permanently in the EEPROM 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 command 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 the protected mode.

Note

If you use CPUs from the SIMATIC S7 system as the PROFIBUS DP master, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the DP/AS-i Link 20E during the DP startup. Use of the call described here is then generally unnecessary.

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 07_H

3.3.9 Get_Extended_Actual_Configuration

Purpose of the Command

With this call, the following configuration data of an addressed AS-i slave obtained by the AS-i master on the AS-Interface are read.

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

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

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number 28_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning	
	Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
0	ID code	I/O configuration
1	Extended ID1 code	Extended ID2 code
2	reserved	
3	reserved	

3.3.10 Set_LPS

Purpose of the Command

With this call, the list of configured AS-i slaves is transferred for permanent storage in the EEPROM of the master.

When this command 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 the protected mode.

Note

If you use CPUs from the SIMATIC S7 system as the PROFIBUS DP master, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the DP/AS-i Link 20E during the DP startup. Use of the call described here is then generally unnecessary.

Structure of the Job Data in the Send Buffer

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Command number 29_H							
1	00H							
2	irrelevant	Slave 1	Slave 2	Slave 3	Slave 4	Slave 5	Slave 6	Slave 7
3	Slave 8	Slave 9	Slave 10	Slave 11	Slave 12	Slave 13	Slave 14	Slave 15
4	Slave 16	Slave 17	Slave 18	Slave 19	Slave 20	Slave 21	Slave 22	Slave 23
5	Slave 24	Slave 25	Slave 26	Slave 27	Slave 28	Slave 29	Slave 30	Slave 31
6	irrelevant	Slave 1B	Slave 2B	Slave 3B	Slave 4B	Slave 5B	Slave 6B	Slave 7B
7	Slave 8B	Slave 9B	Slave 10B	Slave 11B	Slave 12B	Slave 13B	Slave 14B	Slave 15B
8	Slave 16B	Slave 17B	Slave 18B	Slave 19B	Slave 20B	Slave 21B	Slave 22B	Slave 23B
9	Slave 2B4	Slave 25B	Slave 26B	Slave 27B	Slave 28B	Slave 29B	Slave 30B	Slave 31B

The bits in the LPS data have the following meaning: 0: AS-I slave not configured 1: AS-I slave configured.

3.3.11 Set_Offline_Mode

Purpose

This call switches between the online and offline 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 AS-i slaves in the LAS. 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.

In the **offline mode**, the DP/AS-i Link 20E only processes jobs from the user. (Jobs that involve the immediate addressing of an AS-i slave are rejected with an error.) There is no cyclic data exchange with the AS-i slaves.

The OFFLINE=TRUE bit is not permanently stored; in other words, following a cold/warm restart, the DP/AS-i Link 20E is once again in the online mode.

Structure of the Job Data in the Send Buffer

Byte	Meaning		
	Bit 7	**Bit 1**	**Bit 0**
0	Command number: $0A_H$		
1	reserved		Mode (0=online 1=offline)

3.3.12 Select Autoprogramming

Purpose

This call can enable or disable the “automatic address programming” function (see also section 5.1).

The 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 Job Data in the Send Buffer

Byte	Meaning	
	Bit 7 ... Bit 1	**Bit 0**
0	Command number: $0B_H$	
1	reserved	Value for AUTO_ADDR_ENABLE 1= Automatic address programming enabled 0= Automatic address programming disabled

3.3.13 Set_Operation_Mode

Purpose of the Command

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. This also applies to AS-i slaves in which there are differences between the expected and actual configuration.

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

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 DP/AS-i Link 20E module cannot change from the configuration mode to the protected mode.

Structure of the Job Data in the Send Buffer

Byte	Meaning		
	Bit 7	Bit 1	Bit 0
0	Command number: $0C_H$		
1	reserved		Operating mode 0= Protected mode 1=Configuration mode

3.3.14 Change_AS-i_Slave_Address

Purpose of the Command

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 an AS-i slave with address 0 cannot 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.

Note: When the AS-I slave address is changed, the AS-i slave is not reset, in other words, the output data of the AS-i slave are retained until new data are received at the new address.

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: $0D_H$
1	Slave address old
2	Slave address new

3.3.15 Get_AS-i_Slave_Status

Purpose

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
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 Job Data in the Send Buffer

Byte	Meaning
0	Command number: $0F_H$
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning				
	Bit 7 Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	S 3	S 2	S 1	S 0

3.3.16 Get_LPS, Get_LAS, Get_LDS, Get_Flags

Purpose

With this call, the following entries are read out of the DP/AS-i Link 20E:

- The list of active AS-i slaves (LAS)
- The list of detected AS-i slaves (LDS)
- The list of permanent AS-i slaves (LPS)
- the flags according to the AS-i slave specification

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 30_H

Structure of the Response Data in the Receive Buffer

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

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

Meaning of the Bits in Bytes 0 to 23

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

Flag 1

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

Flag 2

Bit Number	Meaning
0	OFFLINE
1	INTERNAL
2	EEPROM_OK
3	AUTO_ADDR_ENABLE
4	PERIPHERY_FAULT
5	reserved
6	reserved
7	MPO startup

Meaning of the Flags

Flag	Meaning
OFFLINE_READY	The flag is set when the offline phase is active.
APF	This flag is set when the voltage on the AS-i cable is too low.
NORMAL_MODE	This flag is set when the DP/AS-i Link 20E is in the normal mode. (The flag is set when the CP is in the normal mode.)
CONFIG_MODE	The flag is set in the configuration mode and reset in the protected mode.
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).
AUTO_ADDR_ASSIGN	This flag is set when the automatic address programming is possible (in other words, AUTO_ADDR_ENABLE = 1 **and** there is no “incorrect” slave connected to the AS-i Interface).
LDS_0	This flag is set when an AS-i slave exists with address 0.
CONFIG_OK	This flag is set when the desired (configured) and actual configuration match.
OFFLINE	This flag is set when the mode is to changed to OFFLINE or this mode has already been adopted.
EEPROM_OK	This flag is set when the test of the internal EEPROM did not detect any errors.
AUTO_ADDR_ENABLE	This flag indicates whether the automatic address programming is enabled (BIT = 1) or disabled (BIT = 0) by the user.
INTERNAL	This flag is always set.
PERIPHERY_FAULT	This flag is set when at least one AS-i slave is signaling a peripheral fault.
MPO startup	The “master_power_on_startup” flag is set after the power supply of the AS-i slave master has been turned on. If the master is later changed to OFFLINE, the bit is reset.

3.3.17 Get_Extended_Total_Configuration

Purpose

This command reads the following data from the DP/AS-i Link 20E:

- 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 and ID code).
- The current parameters of the AS-i slaves (actual parameters)
- The current flags.

This command 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 modified and saved on the DP/AS-i Link 20E as the expected configuration using the command ‘Configure Total System’ (see Section 3.3.18).

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 39_H

Structure of the Response Data in the Receive Buffer

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	00H							
1	00H							
2	LAS slave 0	LAS slave 1	LAS slave 2	LAS slave 3	LAS slave 4	LAS slave 5	LAS slave 6	LAS slave 7
3	LAS slave 8	LAS slave 9	LAS slave 10	LAS slave 11	LAS slave 12	LAS slave 13	LAS slave 14	LAS slave 15
4	LAS slave 16	LAS slave 17	LAS slave 18	LAS slave 19	LAS slave 20	LAS slave 21	LAS slave 22	LAS slave 23
5	LAS slave 24	LAS slave 25	LAS slave 26	LAS slave 27	LAS slave 28	LAS slave 29	LAS slave 30	LAS slave 31
6	LAS slave 0B	LAS slave 1B	LAS slave 2B	LAS slave 3B	LAS slave 4B	LAS slave 5B	LAS slave 6B	LAS slave 7B
7	LAS slave 8B	LAS slave 9B	LAS slave 10B	LAS slave 11B	LAS slave 12B	LAS slave 13B	LAS slave 14B	LAS slave 15B

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
8	LAS slave 16B	LAS slave 17B	LAS slave 18B	LAS slave 19B	LAS slave 20B	LAS slave 21B	LAS slave 22B	LAS slave 23B
9	LAS slave 24B	LAS slave 25B	LAS slave 26B	LAS slave 27B	LAS slave 28B	LAS slave 29B	LAS slave 30B	LAS slave 31B
10	ID_CODE slave 0				I/O configuration slave 0			
11	Ext ID1 slave 0				Ext ID2 slave 0			
12	ID_CODE slave 1				I/O configuration slave 1			
13	Ext ID1 slave 1				Ext ID2 slave 1			
14	ID_CODE slave 2				I/O configuration slave 2			
15	Ext ID1 slave 2				Ext ID2 slave 2			
16	ID_CODE slave 3				I/O configuration slave 3			
17	Ext ID1 slave 3				Ext ID2 slave 3			
18	ID_CODE slave 4				I/O configuration slave 4			
19	Ext ID1 slave 4				Ext ID2 slave 4			
20	ID_CODE slave 5				I/O configuration slave 5			
21	Ext ID1 slave 5				Ext ID2 slave 5			
22	ID_CODE slave 6				I/O configuration slave 6			
23	Ext ID1 slave 6				Ext ID2 slave 6			
24	ID_CODE slave 7				I/O configuration slave 7			
25	Ext ID1 slave 7				Ext ID2 slave 7			
26	ID_CODE slave 8				I/O configuration slave 8			
27	Ext ID1 slave 8				Ext ID2 slave 8			
28	ID_CODE slave 9				I/O configuration slave 9			
29	Ext ID1 slave 9				Ext ID2 slave 9			
30	ID_CODE slave 10				I/O configuration slave 10			
31	Ext ID1 slave 10				Ext ID2 slave 10			
32	ID_CODE slave 11				I/O configuration slave 11			
33	Ext ID1 slave 11				Ext ID2 slave 11			
34	ID_CODE slave 12				I/O configuration slave 12			
35	Ext ID1 slave 12				Ext ID2 slave 12			
36	ID_CODE slave 13				I/O configuration slave 13			
37	Ext ID1 slave 13				Ext ID2 slave 13			
38	ID_CODE slave 14				I/O configuration slave 14			
39	Ext ID1 slave 14				Ext ID2 slave 14			
40	ID_CODE slave 15				I/O configuration slave 15			
41	Ext ID1 slave 15				Ext ID2 slave 15			
42	ID_CODE slave 16				I/O configuration slave 16			
43	Ext ID1 slave 16				Ext ID2 slave 16			
44	ID_CODE slave 17				I/O configuration slave 17			
45	Ext ID1 slave 17				Ext ID2 slave 17			
46	ID_CODE slave 18				I/O configuration slave 18			
47	Ext ID1 slave 18				Ext ID2 slave 18			
48	ID_CODE slave 19				I/O configuration slave 19			
49	Ext ID1 slave 19				Ext ID2 slave 19			
50	ID_CODE slave 20				I/O configuration slave 20			
51	Ext ID1 slave 20				Ext ID2 slave 20			
52	ID_CODE slave 21				I/O configuration slave 21			
53	Ext ID1 slave 21				Ext ID2 slave 21			

54	ID_CODE slave 22	I/O configuration slave 22
55	Ext ID1 slave 22	Ext ID2 slave 22
56	ID_CODE slave 23	I/O configuration slave 23
57	Ext ID1 slave 23	Ext ID2 slave 23
58	ID_CODE slave 24	I/O configuration slave 24
59	Ext ID1 slave 24	Ext ID2 slave 24
60	ID_CODE slave 25	I/O configuration slave 25
61	Ext ID1 slave 25	Ext ID2 slave 25
62	ID_CODE slave 26	I/O configuration slave 26
63	Ext ID1 slave 26	Ext ID2 slave 26
64	ID_CODE slave 27	I/O configuration slave 27
65	Ext ID1 slave 27	Ext ID2 slave 27
66	ID_CODE slave 28	I/O configuration slave 28
67	Ext ID1 slave 28	Ext ID2 slave 28
68	ID_CODE slave 29	I/O configuration slave 29
69	Ext ID1 slave 29	Ext ID2 slave 29
70	ID_CODE slave 30	I/O configuration slave 30
71	Ext ID1 slave 30	Ext ID2 slave 30
72	ID_CODE slave 31	I/O configuration slave 31
73	Ext ID1 slave 31	Ext ID2 slave 31
74	reserved	reserved
75	reserved	reserved
76	ID_CODE slave 1B	I/O configuration slave 1B
77	Ext ID1 slave 1B	Ext ID2 slave 1B
78	ID_CODE slave 2B	I/O configuration slave 2B
79	Ext ID1 slave 2B	Ext ID2 slave 2B
80	ID_CODE slave 3B	I/O configuration slave 3B
81	Ext ID1 slave 3B	Ext ID2 slave 3B
82	ID_CODE slave 4B	I/O configuration slave 4B
83	Ext ID1 slave 4B	Ext ID2 slave 4B
84	ID_CODE slave 5B	I/O configuration slave 5B
85	Ext ID1 slave 5B	Ext ID2 slave 5B
86	ID_CODE slave 6B	I/O configuration slave 6B
87	Ext ID1 slave 6B	Ext ID2 slave 6B
88	ID_CODE slave 7B	I/O configuration slave 7B
89	Ext ID1 slave 7B	Ext ID2 slave 7B
90	ID_CODE slave 8B	I/O configuration slave 8B
91	Ext ID1 slave 8B	Ext ID2 slave 8B
92	ID_CODE slave 9B	I/O configuration slave 9B
93	Ext ID1 slave 9B	Ext ID2 slave 9B
94	ID_CODE slave 10B	I/O configuration slave 10B
95	Ext ID1 slave 10B	Ext ID2 slave 10B
96	ID_CODE slave 11B	I/O configuration slave 11B
97	Ext ID1 slave 11B	Ext ID2 slave 11B
98	ID_CODE slave 12B	I/O configuration slave 12B
99	Ext ID1 slave 12B	Ext ID2 slave 12B
100	ID_CODE slave 13B	I/O configuration slave 13B
101	Ext ID1 slave 13B	Ext ID2 slave 13B
102	ID_CODE slave 14B	I/O configuration slave 14B
103	Ext ID1 slave 14B	Ext ID2 slave 14B

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

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

Flag 1

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

Flag 2

Bit Number	Meaning
0	OFFLINE
1	INTERNAL
2	EEPROM_OK
3	AUTO_ADDR_ENABLE
4	PERIPHERY_FAULT
5	reserved
6	reserved
7	MPO startup

The meaning of the flags is the same as for the Get_LPS, Get_LAS, Get_LDS, Get_Flags job.

3.3.18 Store_Extended_Total_Configuration

Purpose

With this call, the required total configuration of the AS interface is transferred to the AS-i master and stored permanently in the EEPROM as the expected configuration. This configures the DP/AS-i Link 20E.
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.

This call is not made in the protected mode.

For AS-i slaves that comply with the standard profile 7.4, the AS-i master manages the parameter assignment itself. The parameter values for slaves complying with standard profile 7.4 specified in the call are ignored by the AS-i master.

If you use CPUs from the SIMATIC S7 system as the PROFIBUS DP master, then dependent on the configuration in STEP 7, these may send a complete AS-i slave configuration to the DP/AS-i Link 20E during the DP startup. Use of the call described here is then generally unnecessary.

Structure of the Job Data in the Send Buffer

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

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
7	LPS slave 8B	LPS slave 9B	LPS slave 10B	LPS slave 11B	LPS slave 12B	LPS slave 13B	LPS slave 14B	LPS slave 15B
8	LPS slave 16B	LPS slave 17B	LPS slave 18B	LPS slave 19B	LPS slave 20B	LPS slave 21B	LPS slave 22B	LPS slave 23B
9	LPS slave 24B	LPS slave 25B	LPS slave 26B	LPS slave 27B	LPS slave 28B	LPS slave 29B	LPS slave 30B	LPS slave 31B
10	ID_CODE slave 0				I/O configuration slave 0			
11	Ext ID1 slave 0				Ext ID2 slave 0			
12	ID_CODE slave 1				I/O configuration slave 1			
13	Ext ID1 slave 1				Ext ID2 slave 1			
14	ID_CODE slave 2				I/O configuration slave 2			
15	Ext ID1 slave 2				Ext ID2 slave 2			
16	ID_CODE slave 3				I/O configuration slave 3			
17	Ext ID1 slave 3				Ext ID2 slave 3			
18	ID_CODE slave 4				I/O configuration slave 4			
19	Ext ID1 slave 4				Ext ID2 slave 4			
20	ID_CODE slave 5				I/O configuration slave 5			
21	Ext ID1 slave 5				Ext ID2 slave 5			
22	ID_CODE slave 6				I/O configuration slave 6			
23	Ext ID1 slave 6				Ext ID2 slave 6			
24	ID_CODE slave 7				I/O configuration slave 7			
25	Ext ID1 slave 7				Ext ID2 slave 7			
26	ID_CODE slave 8				I/O configuration slave 8			
27	Ext ID1 slave 8				Ext ID2 slave 8			
28	ID_CODE slave 9				I/O configuration slave 9			
29	Ext ID1 slave 9				Ext ID2 slave 9			
30	ID_CODE slave 10				I/O configuration slave 10			
31	Ext ID1 slave 10				Ext ID2 slave 10			
32	ID_CODE slave 11				I/O configuration slave 11			
33	Ext ID1 slave 11				Ext ID2 slave 11			
34	ID_CODE slave 12				I/O configuration slave 12			
35	Ext ID1 slave 12				Ext ID2 slave 12			
36	ID_CODE slave 13				I/O configuration slave 13			
37	Ext ID1 slave 13				Ext ID2 slave 13			
38	ID_CODE slave 14				I/O configuration slave 14			
39	Ext ID1 slave 14				Ext ID2 slave 14			
40	ID_CODE slave 15				I/O configuration slave 15			
41	Ext ID1 slave 15				Ext ID2 slave 15			
42	ID_CODE slave 16				I/O configuration slave 16			
43	Ext ID1 slave 16				Ext ID2 slave 16			
44	ID_CODE slave 17				I/O configuration slave 17			
45	Ext ID1 slave 17				Ext ID2 slave 17			
46	ID_CODE slave 18				I/O configuration slave 18			
47	Ext ID1 slave 18				Ext ID2 slave 18			
48	ID_CODE slave 19				I/O configuration slave 19			
49	Ext ID1 slave 19				Ext ID2 slave 19			
50	ID_CODE slave 20				I/O configuration slave 20			
51	Ext ID1 slave 20				Ext ID2 slave 20			

52	ID_CODE slave 21	I/O configuration slave 21
53	Ext ID1 slave 21	Ext ID2 slave 21
54	ID_CODE slave 22	I/O configuration slave 22
55	Ext ID1 slave 22	Ext ID2 slave 22
56	ID_CODE slave 23	I/O configuration slave 23
57	Ext ID1 slave 23	Ext ID2 slave 23
58	ID_CODE slave 24	I/O configuration slave 24
59	Ext ID1 slave 24	Ext ID2 slave 24
60	ID_CODE slave 25	I/O configuration slave 25
61	Ext ID1 slave 25	Ext ID2 slave 25
62	ID_CODE slave 26	I/O configuration slave 26
63	Ext ID1 slave 26	Ext ID2 slave 26
64	ID_CODE slave 27	I/O configuration slave 27
65	Ext ID1 slave 27	Ext ID2 slave 27
66	ID_CODE slave 28	I/O configuration slave 28
67	Ext ID1 slave 28	Ext ID2 slave 28
68	ID_CODE slave 29	I/O configuration slave 29
69	Ext ID1 slave 29	Ext ID2 slave 29
70	ID_CODE slave 30	I/O configuration slave 30
71	Ext ID1 slave 30	Ext ID2 slave 30
72	ID_CODE slave 31	I/O configuration slave 31
73	Ext ID1 slave 31	Ext ID2 slave 31
74	irrelevant	irrelevant
75	irrelevant	irrelevant
76	ID_CODE slave 1B	I/O configuration slave 1B
77	Ext ID1 slave 1B	Ext ID2 slave 1B
78	ID_CODE slave 2B	I/O configuration slave 2B
79	Ext ID1 slave 2B	Ext ID2 slave 2B
80	ID_CODE slave 3B	I/O configuration slave 3B
81	Ext ID1 slave 3B	Ext ID2 slave 3B
82	ID_CODE slave 4B	I/O configuration slave 4B
83	Ext ID1 slave 4B	Ext ID2 slave 4B
84	ID_CODE slave 5B	I/O configuration slave 5B
85	Ext ID1 slave 5B	Ext ID2 slave 5B
86	ID_CODE slave 6B	I/O configuration slave 6B
87	Ext ID1 slave 6B	Ext ID2 slave 6B
88	ID_CODE slave 7B	I/O configuration slave 7B
89	Ext ID1 slave 7B	Ext ID2 slave 7B
90	ID_CODE slave 8B	I/O configuration slave 8B
91	Ext ID1 slave 8B	Ext ID2 slave 8B
92	ID_CODE slave 9B	I/O configuration slave 9B
93	Ext ID1 slave 9B	Ext ID2 slave 9B
94	ID_CODE slave 10B	I/O configuration slave 10B
95	Ext ID1 slave 10B	Ext ID2 slave 10B
96	ID_CODE slave 11B	I/O configuration slave 11B
97	Ext ID1 slave 11B	Ext ID2 slave 11B
98	ID_CODE slave 12B	I/O configuration slave 12B
99	Ext ID1 slave 12B	Ext ID2 slave 12B
100	ID_CODE slave 13B	I/O configuration slave 13B
101	Ext ID1 slave 13B	Ext ID2 slave 13B

102	ID_CODE slave 14B	I/O configuration slave 14B
103	Ext ID1 slave 14B	Ext ID2 slave 14B
104	ID_CODE slave 15B	I/O configuration slave 15B
105	Ext ID1 slave 15B	Ext ID2 slave 15B
106	ID_CODE slave 16B	I/O configuration slave 16B
107	Ext ID1 slave 16B	Ext ID2 slave 16B
108	ID_CODE slave 17B	I/O configuration slave 17B
109	Ext ID1 slave 17B	Ext ID2 slave 17B
110	ID_CODE slave 18B	I/O configuration slave 18B
111	Ext ID1 slave 18B	Ext ID2 slave 18B
112	ID_CODE slave 19B	I/O configuration slave 19B
113	Ext ID1 slave 19B	Ext ID2 slave 19B
114	ID_CODE slave 20B	I/O configuration slave 20B
115	Ext ID1 slave 20B	Ext ID2 slave 20B
116	ID_CODE slave 21B	I/O configuration slave 21B
117	Ext ID1 slave 21B	Ext ID2 slave 21B
118	ID_CODE slave 22B	I/O configuration slave 22B
119	Ext ID1 slave 22B	Ext ID2 slave 22B
120	ID_CODE slave 23B	I/O configuration slave 23B
121	Ext ID1 slave 23B	Ext ID2 slave 23B
122	ID_CODE slave 24B	I/O configuration slave 24B
123	Ext ID1 slave 24B	Ext ID2 slave 24B
124	ID_CODE slave 25B	I/O configuration slave 25B
125	Ext ID1 slave 25B	Ext ID2 slave 25B
126	ID_CODE slave 26B	I/O configuration slave 26B
127	Ext ID1 slave 26B	Ext ID2 slave 26B
128	ID_CODE slave 27B	I/O configuration slave 27B
129	Ext ID1 slave 27B	Ext ID2 slave 27B
130	ID_CODE slave 28B	I/O configuration slave 28B
131	Ext ID1 slave 28B	Ext ID2 slave 28B
132	ID_CODE slave 29B	I/O configuration slave 29B
133	Ext ID1 slave 29B	Ext ID2 slave 29B
134	ID_CODE slave 30B	I/O configuration slave 30B
135	Ext ID1 slave 30B	Ext ID2 slave 30B
136	ID_CODE slave 31B	I/O configuration slave 31B
137	Ext ID1 slave 31B	Ext ID2 slave 31B
138	reserved	Parameters slave 1
139	Parameters slave 2	Parameters slave 3
140	Parameters slave 4	Parameters slave 5
141	Parameters slave 6	Parameters slave 7
142	Parameters slave 8	Parameters slave 9
143	Parameters slave 10	Parameters slave 11
144	Parameters slave 12	Parameters slave 13
145	Parameters slave 14	Parameters slave 15
146	Parameters slave 16	Parameters slave 17
147	Parameters slave 18	Parameters slave 19
148	Parameters slave 20	Parameters slave 21
149	Parameters slave 22	Parameters slave 23
150	Parameters slave 24	Parameters slave 25
151	Parameters slave 26	Parameters slave 27

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

Flag 1

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

Flag 2

Bit Number	Meaning
0	OFFLINE
1	INTERNAL
2	EEPROM_OK
3	AUTO_ADDR_ENABLE
4	PERIPHERY_FAULT
5	reserved
6	reserved
7	MPO startup

Flags whose values modify the AS-i master mode are shown in gray. The values of the other flags have no significance for the ’store total configuration’ command and cannot be modified on the AS-i master with this call..

CONFIG_MODE	The entry ‘0’ means that the DP/AS-i Link 20E changes to the protected mode after executing the command. The entry ‘1’ means that the configuration mode is retained. 0: On completion of the job, the AS-i master starts up in the protected mode. 1: On completion of the job, the AS-i master starts up in the configuration mode..
AUTO_ADDR_ENABLE	’0’ means that the automatic address programming is disabled, ’1’ means that the automatic address programming is enabled. 0: Automatic address programming disabled. 1: Address programming enabled

3.3.19 Write_Extended_Parameter_List

Purpose

With this command, the parameters for all slaves are transferred to the AS-i master. The AS-i master transfers **only** the parameters **that have changed; in other words, that differ from the previously set (actual) parameters** to the AS-i slaves.

Structure of the Job Data in the Send Buffer

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

3.3.20 Read_Extended_Parameter_Echo_List

Purpose

The read parameter echo list call outputs the echo values of all AS-i slaves. The echo values of an AS-i slave originate from the last parameter call sent to this AS-i slave.

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 33h
1	00h

Structure of the Response Data in the Receive Buffer

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

3.3.21 Read_Version_ID

Purpose

This call reads out the version ID of the firmware of the DP/AS-i Link 20E.

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 14_H

The response of the DP/AS-i Link 20E contains the name and the firmware version number in the form shown below:

Structure of the Response Data in the Receive Buffer

Byte	Meaning
0	S
1	i
2	e
3	m
4	e
5	n
6	s
7	
8	A
9	G
10	
11	L
12	I
13	N
14	K
15	2
16	0
17	I
18	
19	V
20	x
21	.
22	y

Byte	Meaning
23	y
24	
25	
26	
27	
28	
29	
30	
30	

“x.yy” stands for the current version number of the firmware of DP/AS-i Link 20E.

3.3.22 Read_AS-i_Slave_ID

Purpose

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 Job Data in the Send Buffer

Byte	Meaning
0	Command number: 17_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning	
	Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
0	reserved	ID code

3.3.23 Read_AS-i_Slave_Extended_ID1

Purpose

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 Job Data in the Send Buffer

Byte	Meaning
0	Command number: 37_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning	
	Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
0	reserved	Extended ID1 code

3.3.24 Write_AS-i_Slave_Extended_ID1

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 call is intended for diagnostic purposes and is not required in the normal master mode.

The AS-i master passes on the extended ID1 code to the AS-i slave without any plausibility check.

Structure of the Job Data in the Send Buffer

Byte	Meaning	
0	Command number: $3F_H$	
1	irrelevant	Extended ID1 code

3.3.25 Read_AS-i_Slave_Extended_ID2

Purpose

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 Job Data in the Send Buffer

Byte	Meaning
0	Command number: 38_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning	
	Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
0	reserved	Extended ID2 code

3.3.26 Read_AS-i_Slave_I/O

Purpose

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 Job Data in the Send Buffer

Byte	Meaning
0	Command number: 18
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning	
	Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
0	reserved	I/O configuration

3.3.27 Get_LPF

Purpose

With this call, the list of peripheral faults (LPF) signaled by the AS-i slaves is read out from the AS-i master. The LPF is updated cyclically by the AS-i master. Whether and when as AS-i slave signals faults of the attached peripherals (for example wire break) can be found in the description of the AS-i slave.

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number $3E_H$

Structure of the Replies in the Receive Buffer

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	Slave 0	Slave 1	Slave 2	Slave 3	Slave 4	Slave 5	Slave 6	Slave 7
1	Slave 8	Slave 9	Slave 10	Slave 11	Slave 12	Slave 13	Slave 14	Slave 15
2	Slave 16	Slave 17	Slave 18	Slave 19	Slave 20	Slave 21	Slave 22	Slave 23
3	Slave 24	Slave 25	Slave 26	Slave 27	Slave 28	Slave 29	Slave 30	Slave 31
4	Slave 0B	Slave 1B	Slave 2B	Slave 3B	Slave 4B	Slave 5B	Slave 6B	Slave 7B
5	Slave 8B	Slave 9B	Slave 10B	Slave 11B	Slave 12B	Slave 13B	Slave 14B	Slave 15B
6	Slave 16B	Slave 17B	Slave 18B	Slave 19B	Slave 20B	Slave 21B	Slave 22B	Slave 23B
7	Slave 2B4	Slave 25B	Slave 26B	Slave 27B	Slave 28B	Slave 29B	Slave 30B	Slave 31B
8	**reserved**							
...	**reserved**							
13	**reserved**							

For the LPF data, the bit values have the following meaning:

Bit=0: Slave signals no peripheral fault
Bit=1: Slave signals peripheral fault.

3.3.28 Write_AS-i_Slave_Parameter_String

Purpose

With this call, a parameter string complying with AS-i slave profile 7.4 can be sent to the AS-i master that passes on the string to the AS-i slave address specified in the send buffer.

With this call, a send buffer with a maximum of 223 bytes is transferred to the AS-i master. The actual number of parameter 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 parameter bytes).

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 Job Data in the Send Buffer

Byte	Meaning
0	Command number: 40_H
1	Slave address
2	Number of parameter bytes
3	String byte (1)
4	String byte (2)
...	.....
	String byte (n-1)
...	String byte (n)

Maximum value for n=220

3.3.29 Read_AS-i_Slave_Parameter_String

Purpose

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

The AS-i master supplies up to 221 bytes of response data. The number of parameter bytes actually sent by the AS-i slave is signaled by the AS-I master in byte 0 of the receive buffer (number of parameter bytes).

If the AS-i slave sends a string longer than 220 bytes, the AS-i master aborts the string transfer and terminates the job with an error. The received data are 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 Job Data in the Send Buffer

Byte	Meaning
0	Command number 41_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning
0	Number of parameter bytes
1	String byte (1)
2	String byte (2)
...	.....
	String byte (n-1)
...	String byte (n)

Maximum value for n=220

3.3.30 Read_AS-i_Slave_ID_String

Purpose

With this call, an identification string complying with the AS-i slave profile 7.4 can be read from the AS-i slave with the AS-i slave address specified in the send buffer. The AS-i master supplies up to 221 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 0 of the receive buffer (number of ID bytes).

If the AS-i slave sends a string longer than 220 bytes, the AS-i master aborts 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 profile 7.4).

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number 42_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning
0	Number of ID bytes
1	String byte (1)
2	String byte (2)
...	.....
...	String byte (n-1)
...	String byte (n)

Maximum value for n=220

3.3.31 Read_AS-i_Slave_Diagnostic_String

Purpose

With this call, a diagnostic string complying with AS-i slave profile 7.4 can be read from the AS-i slave with the AS-i slave address specified in the send buffer. The AS-i master supplies up to 221 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 0 of the receive buffer (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 Job Data in the Send Buffer

Byte	Meaning
0	Command number 43_H
1	Slave address

Structure of the Response Data in the Receive Buffer

Byte	Meaning
0	Number of diagnostic bytes
1	String byte (1)
2	String byte (2)
...	.....
...	String byte (n-1)
...	String byte (n)

Maximum value for n=220

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4 Slave Diagnostics

With slave diagnostics, errors on PROFIBUS DP (for example parameter assignment errors) and errors on the AS-Interface are signaled to the DP master.

In the protected mode, the DP/AS-Interface Link 20E (DP/AS-i Link 20E) signals“diagnostics” whenever the configuration on the AS-Interface is changed. Changes to the configuration include: when the voltage on the AS-Interface is too low (AS-i Power Fail) and when configuration errors are detected (missing, incorrect or existing but unconfigured AS-i slaves).

If the error is eliminated again on the AS-Interface, this is indicated by“leaving diagnostic state” (bit 3 in the station status 1 set to“0”).

The exact cause of the problem is entered in the device-related diagnostic information – see Section 4.5.

In the configuration mode, errors on the AS-Interface are not indicated to the DP master.

4.1 Overview

Notice

Remember that the DP/AS-i Link 20E only signals errors on the AS-Interface when the DP/AS-i Link 20E is operating in the protected mode and when the diagnostic interrupt is enabled in the DP configuration.

In SIMATIC S7, the default is “diagnostic interrupt deactivated”.

Notice

If the AS-i voltage drops below 14 V, then no DP data exchange is possible due to the lack of power supply. This means that no diagnostic message can be created to signal that the AS-i power supply is too low. The DP master recognizes that the DP/AS-i Link 20E module has failed and indicates this problem to its user program.

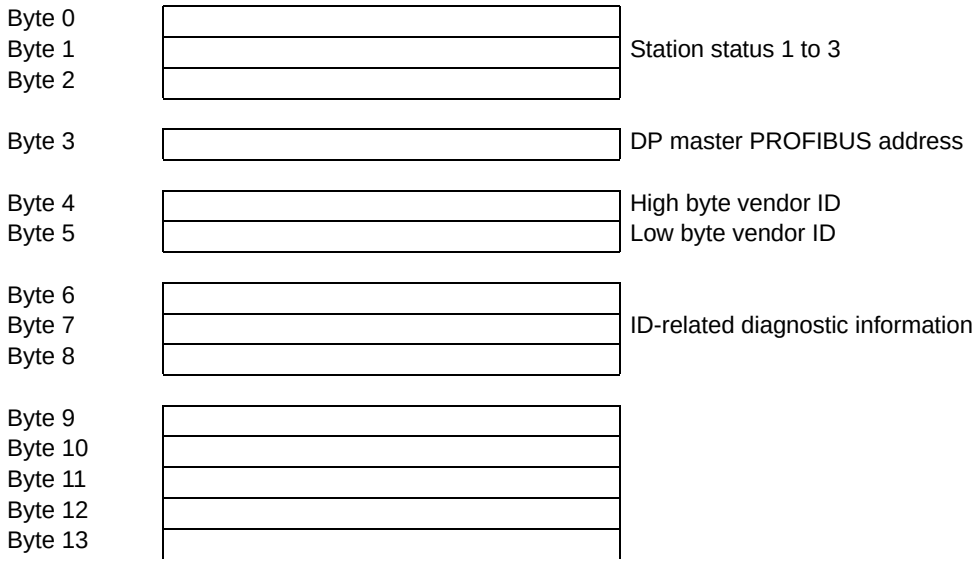
Access Mechanism

Read the manual of your DP master to find out the mechanisms you can use on the DP master to access diagnostic information.

The following sections explain the content of the slave diagnostic information.

Structure of Slave Diagnostic Information

Slave diagnostic information on the DP/AS-i Link 20E module uses 28 bytes and is structured as follows:



Byte 14		Device-related diagnostic information
Byte 15		
Byte 16		
Byte 17		
Byte 18		
Byte 19		
Byte 20	Error in AS-i slave 0 to 7	
Byte 21	Error in AS-i slave 8 to 15	
Byte 22	Error in AS-i slave 16 to 23	
Byte 23	Error in AS-i slave 24 to 31	
Byte 24	Error in AS-i slave 1B..7B	
Byte 25	Error in AS-i slave 8B..15B	
Byte 26	Error in AS-i slave 16B..23B	
Byte 27	Error in AS-i slave 24B..31B	

4.2 Station Status 1 to 3

Purpose

The station status provides an overview of the status of a DP slave.

The following applies to the individual error bits in the station status:

- 0: No error
- 1: error

Station status 1

Byte	Bit	Value/meaning	Remedy
0	0	1: The DP/AS-i Link 20E module cannot be addressed by the DP master.	• Is the correct DP address set on the DP/AS-i Link 20E module? • Bus connector connected? • RS-485 repeater set correctly? • External auxiliary voltage on the DP/AS-i Link 20E module exists?
	1	1: DP/AS-i Link 20E module not yet ready for data exchange.	Has the DP/AS-i Link 20E module already started up?
	2	1: Incorrect configuration data from the DP master. Required configuration is not supported by the DP/AS-i Link 20E module.	Check the configuration
	3	1: Error on the AS-Interface (device-related diagnostics) 0: No error was detected on the AS-Interface.	Evaluate the device-related diagnostic information (see Section 4.5).

Byte	Bit	Value/meaning	Remedy
	4	1: Function not supported, e.g. changing the DP address of the DP/AS-i Link 20E module by the DP master.	Check the configuration.
	5	1: The DP master cannot interpret the response from the DP/AS-i Link 20E module correctly.	Check the PROFIBUS.
	6	1: The DP/AS-i Link 20E detects an incorrect parameter assignment frame (e.g. incorrect length, incorrect ID number, incorrect parameters).	Check the configuration.
	7	1: The DP/AS-i Link 20E module was assigned parameters by a different DP master from the DP master that currently has access to the DP/AS-i Link 20E module.	This bit is always 1 if, for example, you are accessing the DP/AS-i Link 20E module with a PG or a different DP master. The DP address of the parameter assignment master is in the diagnostic byte“Master PROFIBUS Address”.

Station Status 2

Byte	Bit	Value/meaning
1	0	1: The DP/AS-i Link 20E module must have parameters reassigned by the DP master.
	1	1: A static diagnostic message exists.
	2	1 :This bit is always ‘1’ with the DP/AS-i Link 20E module.
	3	1: The response monitoring of the DP/AS-i Link 20E module is activated.
	4	1: The DP/AS-i Link 20E module has received the“FREEZE” control command.
	5	1: The DP/AS-i Link 20E module has received the“SYNC” control command.
	6	0: This bit is always set to ‘0’.
	7	1: The DP/AS-i Link 20E module is deactivated, in other words it is not taking part in the current processing.

Station Status 3

Byte	Value/meaning
2	Station status 3 is reserved and is irrelevant for diagnostics on the DP/AS-i Link 20E module.

4.3 PROFIBUS Address of the DP Master and Vendor ID

Byte	Value	Value/meaning
3	XX H	PROFIBUS address of the DP master In slave diagnostics, byte 3 contains the hexadecimal address of the PROFIBUS master that assigned parameters to the DP/AS-i Link 20E module.
4	80H	Vendor ID of the DP/AS-i Link 20E module In slave diagnostics, byte 4 and byte 5 also include the Vendor ID of the DP/AS-i Link 20E module.
5	98H	

4.4 Structure of ID-Related Diagnostics

ID-related diagnostics is not used by the DP/AS-i Link 20E. Bytes 6 to 8 therefore contain only fixed values.

Byte	Value	Value/meaning
6	43H	Header and length of the ID-related diagnostic information
7	00H	Fixed value
8	00H	Fixed value

4.5 Structure of the Device-Related Diagnostic Information

The device-related diagnostic information consists of a fixed header in bytes 9 to 12 and a variable field with bytes 13 to 23 that signals the errors on the AS-Interface.

Byte	Value	Meaning
9	13H	Header and length of the device-related diagnostic information.
10	01H	Fixed value

Byte	Value	Meaning
11	04H	Fixed value
12	00H	Fixed value

Bytes 13 to 23 of the device-related diagnostic information contain error bits for errors on the AS-Interface. A delta list (bytes 20.23) contains all the AS-i slaves that deviate from the configuration, in other words missing, incorrect or existing but not configured AS-i slaves.

Byte	Bit	Value/meaning
13	0	1: Group error bit
	1	1: Internal error (for example EEPROM defective).
	2	1: External error (for example slave failed or APF).
	3	1: At least one slave differs from the expected configuration.
	4	1: Voltage on the AS-Interface too low (APF).
	5 ..7	0

Byte	Value	Meaning
14	$1C_H$	Module class.

Byte	Bit	Value/meaning
15	0	1: At least one AS-i slave differs from the expected configuration.
	1	0
	2	0: Normal status 1: The DP/AS-i Link 20E module is offline.
	3	1: Hardware error (internal watchdog)
	4..7	0

Byte	Bit	Value/meaning
16	0,1	0
	2	1: EEPROM defective
	4..7	0

Byte	Value	Purpose
17	60H	Fixed value
18	00H	Fixed value
19	40H	Fixed value

Byte	Bit *)	Value/meaning *)
20	0..7	1: Error in AS-i slave 0 to 7
21	0..7	1: Error in AS-i slave 8 to 15
22	0..7	1: Error in AS-i slave 16 to 23
23	0..7	1: Error in AS-i slave 24 to 31
24	0..7	1: Error in AS-i slave 0B.. 7B
25	0..7	1: Error in AS-i slave 8B..15B
26	0..7	1: Error in AS-i slave 16B..23B
27	0..7	1: Error in AS-i slave 24B..31B

*) Bit 0 belongs to slave 0, bit 1 belongs to slave 1 etc.

Note: Bytes 13 to 27 correspond to diagnostic data record 1 of SIMATIC S7.

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5 Dealing with Problems/Error Displays

This chapter contains information on specific operating states of the DP/AS-Interface Link 20E (DP/AS-i Link 20E) and explains how to deal with errors.

5.1 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 DP/AS-i Link 20E module is in the protected mode

and

– 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 (only in the protected mode) this indicates the following:

- Exactly **one** slave has failed.
- Automatic address programming by the DP/AS-i Link 20E is possible.

You can recognize the failed AS-i slave simply because the LED assigned to the slave flashes on the front panel. To see this, you must switch to the slave display (see Section 1.7.2)

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 DP/AS-i Link 20E module now programs this slave with the address of the original slave you are replacing.

The “AUP” display goes off. The LED in the slave display of the DP/AS-i Link 20E module indicates that the slave has been included.

5.2 Error Displays/Remedying Errors

The following table lists the possible causes of problems during operation of the DP/AS-i Link 20E module and possible remedies.

Table 5-1

Error	Possible Cause	Remedy
BF LED lit (indicates an error on PROFIBUS)	Connection to the PROFIBUS master interrupted.	Check the attachment of the DP master and DP/AS-i Link 20E module to PROFIBUS.
	DP master in wrong mode.	Check/correct the mode on the DP master.
	Incorrect parameter assignment/ configuration by the PROFIBUS DP master. The PROFIBUS address configured on the DP master does not match the address of the DP/AS-i Link 20E module.	Check/correct the configuration of the DP master.
APF LED lit	Power requirements of the AS-i slaves are too high. Result: Voltage on the AS-i cable too low.	Check the power requirements of the AS-i slaves. If necessary, supply the AS-i slaves with an external voltage.
PWR LED not lit	The AS-i power supply unit is not connected or is defective.	Check the connection of the AS-i power supply unit and if necessary replace it.
	Short circuit on the AS-i cable	Check the AS-i cable and the connected AS-i slaves.
SF lights up without pressing the SET button.	The DP/AS-i Link 20E module signals diagnostic information to the DP master. Causes: Parameter assignment/ configuration error on PROFIBUS, configuration error on the AS-Interface (for example slave failed) or AS-i Power Fail.	Check the “CER”, ”APF” LEDs. Evaluate the bits in the slave diagnostic information to identify the error in greater detail.
SF is lit when the SET button is pressed.	A slave with address 0 exists when there is a change to the protected mode.	Remove the slave with address 0 from the AS-i cable.
CER LED is permanently lit.	The DP/AS-i Link 20E module has not yet been configured.	Configure the DP/AS-i Link 20E module using the SET button on the front panel.
	A configured AS-i slave has failed (evaluate the slave display).	Replace the defective AS-i slave or reconfigure the DP/AS-i Link 20E module 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 DP/AS-i Link 20E module.

Table 5-1 , continued

Error	Possible Cause	Remedy
	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 DP/AS-i Link 20E module.
	Short circuit on the AS-i cable	Check the AS-i cable and the connected AS-i slaves.
The CER display 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 DP/AS-i Link 20E module and check the AS-i cable. Check that the shield of the AS-i power supply unit is connected correctly.
The DP/AS-i Link 20E module does not switch from the configuration mode to the protected mode.	Cyclic data exchange with the DP master is active.	Interrupt the connection to the DP master (by unplugging the bus connector) or switch the DP master to STOP.
	The SET button was not pressed long enough.	Press the SET button for at least 0.5 seconds.
	An AS-i slave with address 0 is connected to the AS-i cable. The DP/AS-i Link 20E module cannot switch to the protected mode as long as this slave exists.	Remove the AS-i slave with address 0.
The DP/AS-i Link 20E module does not switch from the protected mode to the configuration mode.	Cyclic data exchange with the DP master is active.	Interrupt the connection to the DP master (by unplugging the bus connector) or switch the DP master to STOP.
	The SET button was not pressed long enough.	Press the SET button for at least 0.5 seconds.
After failure of an AS-i slave, the “AUP” display remains off.	The DP/AS-i Link 20E module is in the configuration mode.	”Automatic Programming” is not possible in the configuration mode. Program the address of the new AS-i slave with the address programmer or using the command interface of the DP/AS-i Link 20E.
	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.

Table 5-1 , continued

Error	Possible Cause	Remedy
	The DP/AS-i Link 20E module has detected unconfigured AS-i slaves.	Remove the unconfigured AS-i slaves from the AS-i cable.
Automatic address programming is unsuccessful although the “AUP” display is 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 DP/AS-i Link 20E module (with the SET button).
	The replaced AS-i slave does not have the address “ZERO”.	Set the address of the replaced slave with the addressing unit.
	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 “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.

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AS-Interface Protocol Implementation Conformance Statement (PICS) A

PICS for the DP/AS-Interface Link 20E

Table A-1

Vendor	SIEMENS AG
Product Name	DP/AS-Interface Link 20E
Order Number	6GK1415-2AA01
Version	1
Master Profile	M1e
Date	30.11.99

List of Master Functions Available

Table A-2

No.	Function or Call on the Host Interface (symbolic representation)	M1e	Comment / Function implemented by / see Section
1	Image, Status = Read_IDI()	X	By access to the I/O data of the DP/AS-Interface Link 20E by the DP master.
2	Status = Write_ODI(Image)	X	By access to the I/O data of the DP/AS-Interface Link 20E by the DP master.
3	Status = Set_Permanent_Parameter(Addr, Param)	X	By the PROFIBUS parameter assignment or by command (see Section 3.3)
4	Param, Status = Get_Permanent_Parameter(Addr)	X	see Section 3.3
5	Status, Param = Write_Parameter(Addr, Param)	X	see Section 3.3
6	Status, Param = Read_Parameter(Addr)	X	see Section 3.3
7	Status = Store_Actual_Parameters()	X	see Section 3.3

Table A-2 , continued

No.	Function or Call on the Host Interface (symbolic representation)	M1e	Comment / Function implemented by / see Section
8	Status = Set_Permanent_Configuration(Addr, Config)	X	see Section 3.3
9	Status, Config = Get_Permanent_Configuration(Addr)	X	see Section 3.3
10	Status = Store_Actual_Configuration()	X	By pressing the SET button; also using a command (see Section 3.3)
11	Status, Config = Read_Actual_Configuration(Addr)	X	see Section 3.3
12	Status = Set_LPS(List31)	X	see Section 3.3
13	Status, List31 = Get_LPS()	X	see Section 3.3
14	Status, List31 = Get_LAS()	X	see Section 3.3
15	Status, List32 = Get_LDS()	X	see Section 3.3
16.0	Status = Get_Flags()	X	see Section 3.3
16.1	Status, Flag = Get_Flag_Config_OK()	X	see Section 3.3
16.2	Status, Flag = Get_Flag_LDS.0()	X	see Section 3.3
16.3	Status, Flag = Get_Flag_Auto_Address_Assign()	X	see Section 3.3
16.4	Status, Flag = Get_Flag_Auto_Prog_Available()	X	see Section 3.3
16.5	Status, Flag = Get_Flag_Configuration_Active()	X	see Section 3.3
16.6	Status, Flag = Get_Flag_Normal_Operation_Active()	X	see Section 3.3
16.7	Status, Flag = Get_Flag_APF()	X	see Section 3.3
16.8	Status, Flag = Get_Flag_Offline_Ready()	X	see Section 3.3
16.9	Status, Flag = Get_Flag_Periphery_OK()	X	see Section 3.3
17	Status = Set_Operation_Mode(Mode)	X	By pressing the SET button; also with a command (see Section 3.3)
18	Status = Set_Offline_Mode(Mode)	X	see Section 3.3
19	Status = Activate_Data_Exchange(Mode)	–	not implemented
20	Status = Change_Slave_Address(Addr1, Addr2)	X	see Section 3.3
21.1	Status = Set_Auto_Address_Enable	X	see Section 3.3
21.2	Status = Get_Auto_Address_Enable	X	see Section 3.3
22.1	Status, Resp = Cmd_Reset_ASI_Slave(Addr, RESET)	X	see Section 3.3

Table A-2 , continued

No.	Function or Call on the Host Interface (symbolic representation)	M1e	Comment / Function implemented by / see Section
22.2	Status, Resp = Cmd_Read_IO_Configuration(Addr, CONF)	X	see Section 3.3
22.3	Status, Resp = Cmd_Read_Identification_Code(Addr, IDCOD)	X	see Section 3.3
22.4	Status, Resp = Cmd_Read_Status(Addr, STAT)	X	see Section 3.3
22.5	Status, Resp = Cmd_Read_Reset_Status(Addr, STATRES)	–	not implemented
22.6	Status, Resp = Cmd_Read_Ext_ID-Code_1(Addr, IDCOD1)	X	see Section 3.3
22.7	Status, Resp = Cmd_Read_Ext_ID-Code_2(Addr, IDCOD2)	X	see Section 3.3
23	Status, S_List = Get_LPF()	X	see Section 3.3
24	Status = Write_Extended_ID-Code_11(S_Ext_ID-Code_1)	X	see Section 3.3
Part B	**Supported Slave Profiles**		
1	Analog slave profile S7.3 support integrated	X	see Section 3.3
2	Analog slave profile S7.4 support integrated	X	see Section 3.3

Symbols in column 3 (M2)

Symbol	Purpose
X	Function exists
–	Function does not exist

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:

$$t_{cycl} = (1 + \text{number of activated AS-i slaves}) \times 156\ \mu s$$

Note:

If two 2 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 1 AS-i slave in the above formula. The reason for this is that slave pairs with the same address are only addressed in every second cycle. The cycle time in the formula above is therefore doubled for such slaves.

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Structure of the PROFIBUS DP Parameter Assignment and Configuration Frame

B

When you require this information

This section describes the structure of the parameter assignment and configuration frame for the DP/AS-Interface Link 20E. You require this information if you use configuration tools that cannot interpret the GSD file of the DP/AS-Interface Link 20E supplied on diskette with this manual.

Note

If you configure the DP/AS-Interface Link 20E using configuration tools such as STEP 7 or COM PROFIBUS, you do **not** require this information. The menus of these tools show you the options available for configuring/assigning parameters to the DP/AS-Interface Link 20E.

Configuration Frame

The structure of the configuration frame depends on whether you require I/O operation with up to 31 AS-i slaves or with up to a maximum of 62 AS-i slaves in the extended addressing mode.

Operation	Number of output bytes on the DP master	Number of input bytes on the DP master	Configuration Frame		
I/O operation for up to 31 AS-i slaves **1)**	16	16	Byte 0 : $3F_H$		
I/O operation in the extended addressing mode	32	32	Byte 0	Byte 1	Byte 2
			$C0_H$	$1F_H$	$1F_H$

1) The default configuration (response to a Get_Cfg frame prior to initialization by the DP master) is the configuration with I/O operation for up to 31 AS-i slaves.

Structure of the Parameter Assignment Frame

The parameter assignment frame of the DP/AS-Interface Link 20E is 17 bytes long. It consists of a 7 byte standard section complying with EN 50170 and a further 10 byte long field with additional parameters for the DP/AS-Interface Link 20E.

Standard Section

Byte 0		Station status, see /6/
Byte 1		Watchdog factor 1, see /6/
Byte 2		Watchdog factor 2, see /6/
Byte 3		Min. T_{SDR}, see /6/
Byte 4	$_{80}$H	Vendor ID, high byte, see /6/
Byte 5	$_{98}$H	Vendor ID, low byte, see /6/
Byte 6		Group ID, see /6/

User-specific Parameters

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
Byte 7 1)	X	X	0	0	0	X	X	X	
Byte 8 2)	0	0	X	0	0	0	0	0	
Byte 9	00H								Fixed value
Byte 10	07H								Fixed value
Byte 11	81H								Fixed value
Byte 12	00H								Fixed value
Byte 13	00H								Fixed value
Byte 14	$1C_H$								Fixed value
Byte 15	00H								Fixed value
Byte 16 3)	0	0	0	0	0	X	X	X	(fixed value)

1) Range of values for byte 7:
- bit 0 =1: Start bit monitoring on;
- bit 1 =1: Stop bit monitoring on;
- bit 2 =0: Watchdog base =10 ms; bit 2 =1: Watchdog base = 1 ms;
- bit 6 =0: Fail-safe mode is not supported;
- bit 7 =0: DP standard operation;
- bit 7 =1: DPV1 mode (read_record/write_record interface enabled)

2) Range of values for byte 8:
- bit 5 =0: Disable diagnostic interrupt; bit 5 =1: Enable diagnostic interrupt;

3) Range of values for byte 16:
- bit 0 =0: Configuration master is DPV0 or DPV1 master;
- Bit 1 =0 button configuration;
- bit 2 =1: DP/AS-i Link 20E is operated by an S7 DP master that was configured with a GSD file (older STEP 7 versions); with all other DP masters, bit 2 =0.

Note

In the configuration tool, the user-specific parameters can also be represented starting with the identification “Byte 0”. Note the information in the documentation and help texts of the configuration tool.

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References

C

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/2/

AS-Interface Complete Specification

can be ordered from the ASI Association e.V.

Address:

AS-International Association e.V.
Manager: Dr. Otto W. Madelung
Auf den Broich 4A
D – 51519 Odenthal
Germany

Tel.: +49 – 2174 – 40756
Fax.: +49 – 2174 – 41571

(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.com

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SIMATIC NET Industrial Communications Networks

Catalog IK 10

The catalog can be ordered from your local SIEMENS branch office or distributor.

/4/

Profibus & AS-Interface
Components on the Field Bus
Catalog ST PI

The catalog can be ordered from your local SIEMENS branch office or distributor.

/5/

SIMATIC NET
Industrial Communications Networks PROFIBUS Networks
Manual
Siemens AG

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PROFIBUS standard EN 50170

Order Numbers

The order numbers of the SIEMENS documentation listed above can be found in the catalogs “SIMATIC NET Industrial Communication, Catalog IK10” and “SIMATIC Programmable Controllers SIMATIC S7 / M7 / C7 – Components for Integrated Automation, Catalog ST70”.

You can order these catalogs and obtain additional information from your local SIEMENS branch or distributor.

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Notes on the CE Mark

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Product name:

DP/AS-Interface Link 20E Order no.: 6GK1415-2AA01

EU Directive EMC 89/336/EEC

The product listed above meets the requirements of the EU directive 89/336/EEC “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
Bereich Automatisierungstechnik
Industrielle Kommunikation (A&D PT2)
Postfach 4848
D-90327 Nuremberg, Germany

Area of Application

The product meets the following requirements:

Area of application	Requirements	
	Noise emission	Noise immunity
Industrial	EN 50081-2 : 1993	EN 50082-2 : 1995

Installation Instructions

The product meets the requirements providing you adhere to the instructions for installation and operation as described in this documentation:

Information for Manufacturers of Machines

The product is not a machine in the sense of the EU directive on machines. There is therefore no conformity certificate for this product complying with the EU directive for machines 89/392/EEC.

If the product is integrated as part of a machine, it must be included in the conformity application of the manufacturer.

DP/AS-Interface Link 20E
Release 11/2002
C79000-G8976-C138–04

Glossary

E

E.1 Terms Relating to AS-Interface

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. (previous name: 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 standard slaves that exchange analog values with the AS-i master.

AS-i library

Library whose functions allow the user program to communicate with the AS-i driver.

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 an extended AS-i master.

AS-i module

For the AS-Interface, a module concept has been defined that allows the block-type linking of AS-i slaves – sensors and actuators – via AS-i modules.
The following types of module exist:
Active AS-i modules with integrated AS-i chip: These are used to attach up to four conventional sensors and four conventional actuators.
Passive AS-i modules: These function as distributors and allow attachment of up to four sensors and actuators with AS-i chips.
In keeping with the concept of the standard AS-i master and the extended AS-i master, either AS-i chaps 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 packaging (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.

Extended AS-i master

An extended AS-i master 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 of SIMATIC NET support the integrated transfer of AS-Interface analog slaves that operate in compliance with Profile 7.3/7.4 of the AS-Interface Specification.

LAS

List of activated slaves.

LDS

List of detected slaves.

LPS

List of permanent slaves.

Nibble

A nibble is a unit of information consisting of four bits.

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.

E.2 Terms Relating to PROFIBUS

Bus parameter

Bus parameters control the way in which data is transmitted on the bus. Each –> station on –> PROFIBUS must use bus parameters that match the bus parameters of the other stations.

CLEAR mode

Mode of the DP master. Inputs are read cyclically, outputs remain set to 0.

CP

Communications processor: Module for communications tasks for installation in computers or programmable logic controllers.

Device database

Device database data (in a GSD file) contain DP slave descriptions complying with EN 50170, Vol 2. The use of DDB makes it easier to configure the –> DP master and –> DP slaves.

Distributed peripheral I/Os (DP)

Input and output modules used in a distributed configuration by the CPU (central processing unit of the controller). The programmable logic controller and the distributed I/Os are connected via the
–> PROFIBUS bus system. For the programmable logic controllers, there is no difference between these I/Os and local process inputs or process outputs.

DP master

Active station on –> PROFIBUS that can send frames unsolicited when it is in possession of the token .

DP master system

A –> DP master and all the –> DP slaves with which this DP master exchanges data.

DP mode

In communication between the DP master and the DP slaves, a distinction is made between the following four modes:
– OFFLINE
– STOP
– CLEAR
– RUN
Each of these modes is characterized by defined actions between the DP master and DP slave.

DP slave

A –> station with slave functions in –> PROFIBUS DP.

Firmware

In this case, the software running on the DP/AS–Interface Link 20E.

FREEZE mode

The FREEZE mode is a DP mode in which process data can be acquired from one, or several (group) or from all DP slaves at the same time. The point at which the data is acquired is indicated by the FREEZE command (this is a control frame for synchronization).

Maximum station delay

A –> bus parameter for –> PROFIBUS. The Maximum Station Delay (max. TSDR) specifies the longest time required by one of the –> stations in a –> subnet between receiving the last bit of an unacknowledged –> frame to sending the first bit of the next frame. A sender must wait until the max. TSDR has elapsed after sending an unacknowledged frame before it can send a further frame.

Minimum Station Delay

A –> bus parameter for –> PROFIBUS. The Minimum Station Delay (min. TSDR) specifies the minimum time that the receiver of a –> frame must wait before sending the confirmation or sending a further frame. The min. TSDR is based on the longest time required by a station in the sub system to receive a confirmation after sending the frame.

MPI

The multipoint interface (MPI) is the PG interface of SIMATIC S7.

PROFIBUS

A field bus complying with EN 50170, Vol. 2. Previous name: SINEC L2.

PROFIBUS address

The PROFIBUS address is a unique identifier of a –> station connected to –> PROFIBUS. The PROFIBUS address is transferred in the –> frame to address a station.

PROFIBUS DP

DP mode complying with EN 50170, Vol 2.

SIMATIC NET

Siemens SIMATIC Network and Communication. Product name for –> networks and network components from Siemens (previously SINEC).

SIMATIC NET PROFIBUS

SIMATIC NET bus system for industrial application based on PROFIBUS. (previously SINEC L2).

SINEC

Previous product name for networks and network components from Siemens. New name: SIMATIC NET.

SYNC mode

The SYNC mode is a DP mode in which one, more than one (group) or all –> DP slaves transfer data to their process outputs at the same time. The time at which the data is transferred is signaled by the SYNC command (a control frame for synchronization).

Target rotation time

A –> bus parameter for –> PROFIBUS. The token gives a –> station on PROFIBUS the right to transmit frames. A station compares the token rotation time it has measured with the target rotation time. The difference between the two times decides whether only high or also low priority frames can be sent.

Token bus

Network access technique for bus access rights with more than one active station (used in PROFIBUS). The token is passed on from active station to active station. The following applies to each active station: The token passes through a complete rotation between a station sending and receiving the token.

UNFREEZE

Job for resetting the –> FREEZE mode.

UNSYNC

Job for resetting the –> SYNC mode.

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