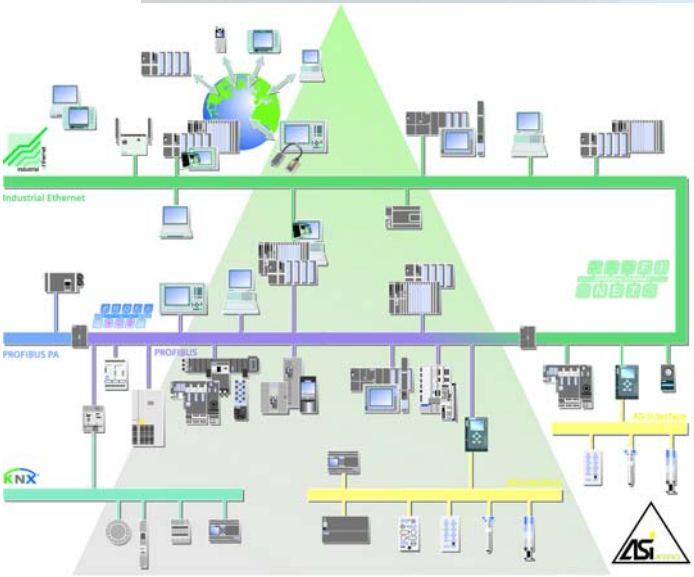
SIEMENS

SIMATIC NET

DP/AS-Interface Link 20E

Manual



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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 98/37/EC.

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Note the following:

Warning

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

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

Prior to Startup

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.

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Industry Automation
Industrial Communication
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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, in places 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.

Validity of this manual

This manual is valid for the DP/AS–i Link 20E with order number 6GK1 415–2AA10 as of hardware version 1 and with firmware version V3.0.

We recommend the following procedure ...

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

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

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

- You will find the information you require about connecting and operating the DP/AS−i Link 20E 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
- Familiarity with the manual ‘AS-Interface − Introduction and Basic Information’ (on the accompanying product CD).

CD with the GSD file

The accompanying CD contains the GSD file that you require to configure the DP/AS−i Link 20E with your DP master, if the DP master is not a Siemens device (see Section 1.10.1).

❑

Contents

Technical description, installation instructions, operation

1

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

You will learn the following, ...

- How to install the DP/AS-i Link 20E;
- The display and control elements of the DP/AS-i Link 20E;
- How to configure the DP/AS-i Link 20E 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.

1.1 General notes on operation − safety warnings

Caution

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

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

1.2 Use of the module

DP slave and AS-Interface master

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

- The DP/AS-i Link 20E connects the actuator-sensor interface with PROFIBUS DP.
- Using the DP/AS-i Link 20E, 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

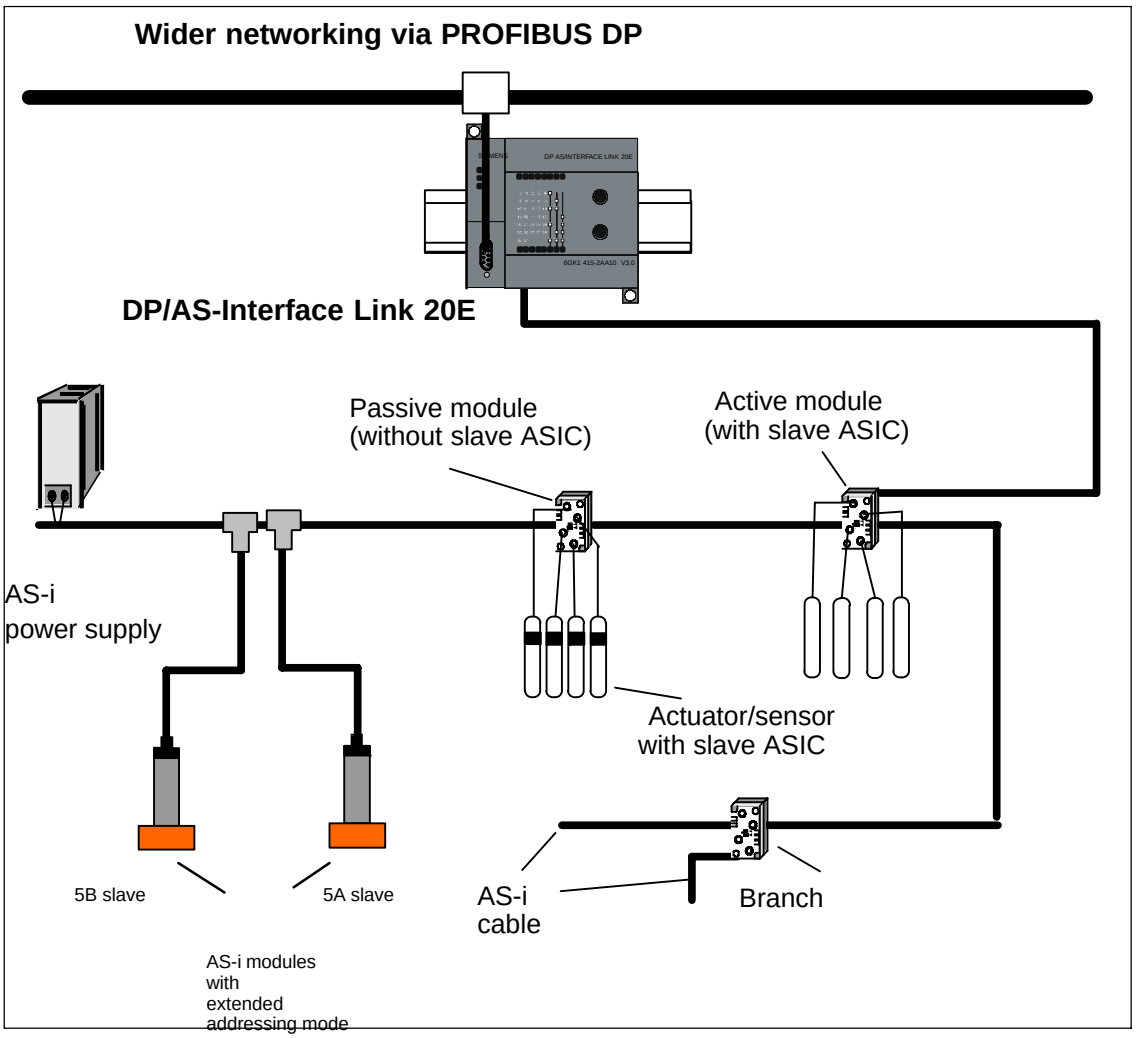


Figure 1-1 Example of a system configuration with the DP/AS-i Link 20E

Features

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

- DPV0 mode

  In DPV0 mode, with a maximum of 32/32 bytes I/O, up to 62 digital AS-i slaves can be served at a transmission speed of 9.6 Kbps to 12 Mbps. The command interface and access to the AS-i analog values are not available in DPV0 mode.

- DPV1 mode

  In DPV1/DPx mode, with a maximum of 32/32 bytes I/O, up to 62 digital AS-i slaves can be served at a transmission speed of 9.6 Kbps to 12 Mbps.

  In addition to this, a maximum of 62 AS-i analog slaves with up to 2 analog I/O channels can be served.

  Commands according to the AS-i master specification are implemented with the read_record/write_record (data record 2) services.

Components of the product

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

- DP/AS-i Link 20E
- CD with sample program and documentation

  The STEP 7 block FC “ASi_3422” is on this CD.

1.3 Technical data of the module

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

Table 1-1

Feature	Explanation/values
AS-i cycle time	• 5 ms with 31 slaves • 10 ms for 62 slaves with the extended addressing mode
Configuration of the AS-Interface	Using a button on the front panel or with STEP 7
Supported AS-i master profiles	M1...M4
Connection of the AS-i cable	Via a 12-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	29.5 V to 31.6 V DC
Current consumption from the AS-i cable	max. 200 mA at 30 V
Power consumption	max. 4.5 W
Cable length	max. 100 m
Cable diameter (AS-i cable)	2 x 1.5 mm^2 (2 x 0.8 mm^2: reduced cable length!)
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° (non-condensing)
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 Approvals

Table 1-2 Description of the approvals

c-UL-us	UL 508
	CSA C22.2 No. 142
c-UL-us for hazardous locations	ANSI&ISA 12.12.01 CL. 1, Div. 2 GP.A.B.C.D T4 CL. 1, Zone 2, GP.IIC, T4
FM	FM 3611 CL. 1, Div. 2 GP.A.B.C.D T4 CL. 1, Zone 2, GP.IIC. T4 Ta: 0...+60°C
C-TICK	AS/NZS 2064 (Class A)
CE	EN 61000-6-2, EN 61000-6-4 (replaces EN 50081-2)
ATEX Zone 2	EN 60079−15:2005, EN 60079−0:2006 II 3 G Ex nA II T4 KEMA 08 ATEX 0003X

Note

The current approvals are printed on the module.

1.5 Installing the module

Options

DP/AS-i Link 20E has degree of protection IP20.

- You can install the DP/AS-i Link 20E on a standard rail (DIN 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 DIN rail

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

1. The module is placed on the 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 DIN rail

To remove the module from the DIN 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 455C.

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

1.6 Front panel − access to all functions

Connection, display and control elements

On the front panel, you have access to all the connection, display and control elements of the DP/AS-i Link 20E.

The terminal block for connecting to the AS-Interface at the bottom right is covered by a front panel.

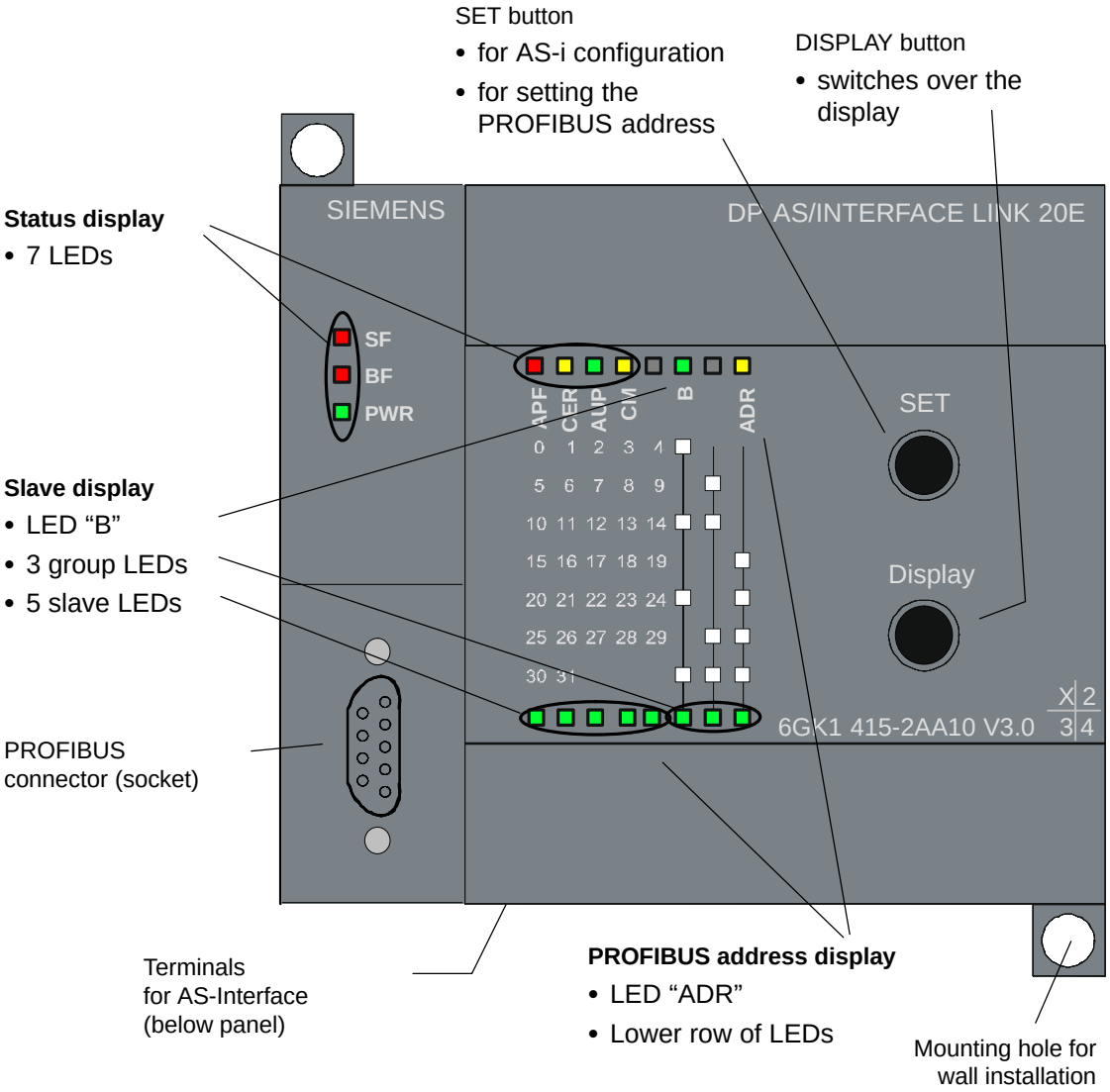


Figure 1-2 Front view

1.7 Connection to AS-Interface and PROFIBUS

Connections

DP/AS-i Link 20E has the following connectors:

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

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

Connectors to the AS-i cable

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

Warning

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

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

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

This allows the DP/AS-i Link 20E to be looped into the AS-i cable.

Caution

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

The maximum current via the AS-i contacts is 3 A. If this value is exceeded on the AS-i cable, the DP/AS-i Link 20E may not be looped into the AS-i cable but must be connected via a tap line (only one connector pair of the DP/AS-i Link 20E used).

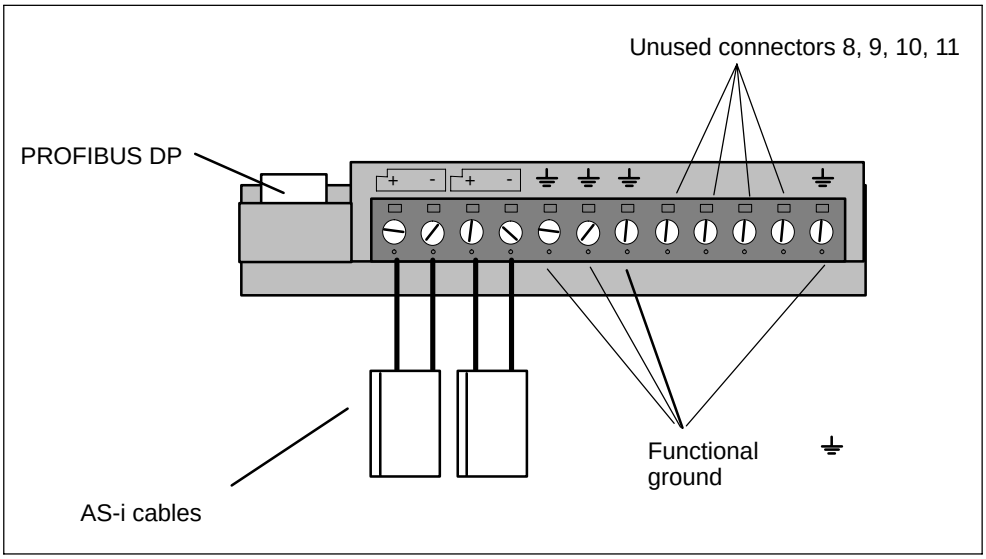


Figure 1-3 Connection of the AS-i cable

Functional ground

The DP/AS-i Link 20E has four connectors for functional ground. One of these connectors should be connected to the PE conductor with as little resistance as possible.

Caution

The free terminals 8, 9, 10 and 11 in the terminal block must not be connected.

Connector for 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 /4/.

To connect to PROFIBUS DP, bus connectors are available with cable outlets at different angles (05, 305 and 905). Once again, follow the instructions in /4/.

1.8 Display and controls

1.8.1 Display modes and meaning of the LEDs

Meaning of the LED display

- The status display

  The status display indicates statuses and error messages of the Link module itself and the connected AS-i line. The following LEDs belong to the status display:

  - The 3 status LEDs “SF”, “BF” and “PWR” in the LED column at the top left
  - The 4 status LEDs “APF”, “CER”, “AUP” and “CM” in the upper row of LEDs

- The slave display

  The slave display shows activated or malfunctioning AS-i slaves:

  - The 5 left-hand LEDs of the bottom row of LEDs (slave LEDs) show the slave number.
  - The 3 right-hand LEDs of the bottom row of LEDs (group LEDs) show the slave group.
  - The “B” LED in the upper row of LEDs shows B slaves.

- The PROFIBUS address display

  The PROFIBUS address display is used to display and set the PROFIBUS address of the DP/AS-i Link 20E. It includes the following LEDs:

  - The 7 right-hand LEDs of the lower row of LEDs (from the left: LED no. 2−8)
  - The “ADR” LED in the upper row of LEDs to the right

Changing between the slave display and PROFIBUS address display

The lower row of LEDs (see Figure 1-2) has a double function:

- In the “Slave display“ mode to display the connected slave modules
- In the “PROFIBUS address display“ to display the PROFIBUS address

With the “Display” button, you change between the slave display and PROFIBUS address display. For details on changing over the display mode, refer to Sections 1.8.3 and 1.8.4.

1.8.2 Status display

Meaning of the 7 status LEDs

The 7 status LEDs have the following meaning:

Table 1-3 Meaning of the status LEDs

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 is interrupted or the DP master is inactive; • The LED flashes when the DP/AS-i Link 20E was not or was incorrectly configured or assigned parameters by the DP master.
SF (red)	System error	The LED is lit, ... • When a diagnostic interrupt (entering state) was triggered in protected mode; • When the DP/AS-i Link 20E has detected an internal error (for example EEPROM defective). • When while pressing the SET button, the DP/AS-i Link 20E cannot currently make the required mode change (for example a slave exists with address 0).
PWR (green)	Power	The LED is lit when the DP/AS-i 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 unstable or too low. Note: The DP AS-i Link 20E is supplied entirely from the AS-Interface. You can recognize a total outage of the AS-i power when the “PWR” LED is not lit.
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. If they do not match, the “CER” LED is lit. The “CER” LED lights up, ... • 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 a connected AS-i slave has configuration data (I/O configuration, ID code) that is different from the AS-i slave configured on the DP/AS-i Link 20E;
AUP (green)	Autoprog available	In protected mode of the DP/AS-i Link 20E, the LED shows that automatic address programming of an AS-i slave is possible. The automatic address programming makes it much easier to exchange a defective AS-i slave on the AS-i cable (for more detailed information refer to Section 5.1).

Table 1-3 Meaning of the status LEDs, (continued)

LED (color)	Status	Meaning
CM (yellow)	Configuration Mode	This LED displays the mode of the DP/AS-i Link 20E. • Indicator on: configuration mode • Indicator off: protected mode The configuration mode is only required for installing and starting up the DP/AS-i Link 20E. In the configuration mode, the DP/AS-i Link 20E activates all connected AS-i slaves and exchanges data with them. For more information about the configuration mode, refer to Section 1.9.

1.8.3 Slave display for AS-i slaves

Recognizing the “Slave display” mode

You can recognize the slave display when the “ADR” LED is not lit.

Operation

After you turn the module on, the lower row of LEDs indicates slaves 0−4 (standard slaves or A slaves).

By pressing the “Display” button repeatedly, the slaves are indicated in groups one after the other, first all standard or A slaves (LED ”B” off) and then all B slaves (LED ”B” on).

After the B slaves of group 7, the next time you press the “Display” button, you move on to the PROFIBUS address display (”ADR” LED lit up).

Identification of the slaves based on the group LEDs and the slave LEDs

The slaves are identified based on the group LEDs and the slave LEDs in the lower row of LEDs (see also Figure 1-2).

The slave groups are indicated one above the other on the housing in rows between the upper and lower rows of LEDs. Each group is identified by individual or a combination of 2 or 3 group LEDs. The image of the LED display of the group LEDs is shown beside each printed slave group by white boxes on the housing.

The individual slaves of the relevant group are identified by the corresponding slave LEDs:

- Activated slaves are indicated by being lit permanently green.
- Missing or extra slaves are displayed flashing green.

The “B” LED in the upper row of LEDs identifies B slaves.

- “B” LED off: standard or A slave
- “B” LED on: B slave

The following figure shows an example.

Example of a slave display

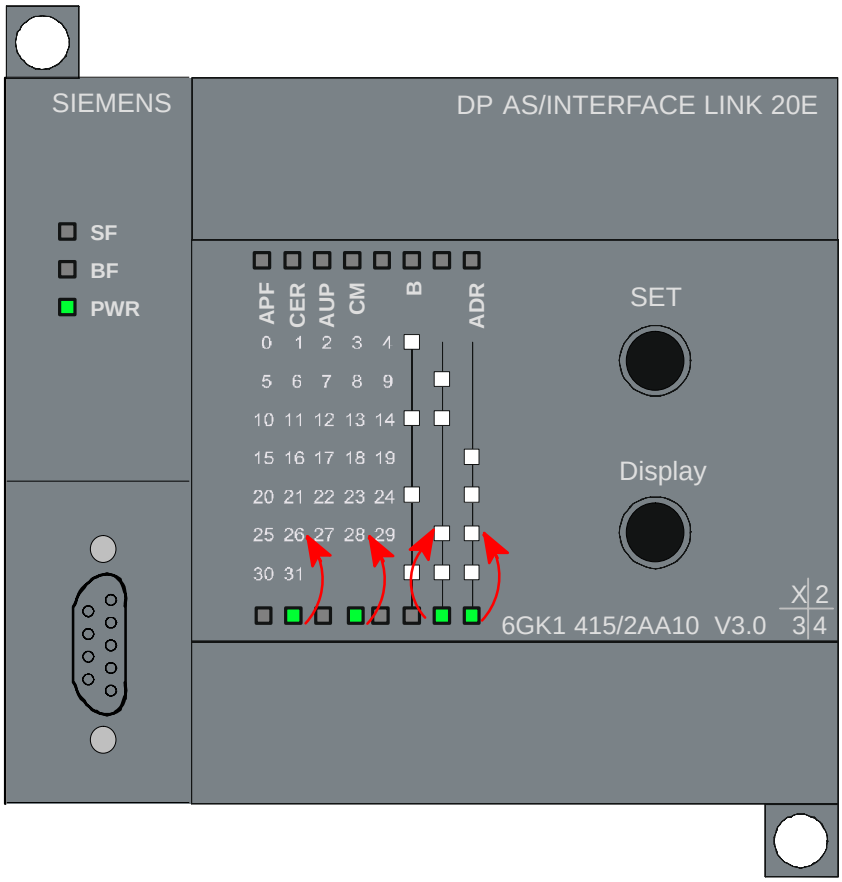


Figure 1-4 Example of a slave display

From the display you can obtain the following information:

- The group LEDs (right), select the sixth group of five.
- Within this group, the 5 slave LEDs indicate the active AS-i slaves no. 26 and 28.
- If the “B” LED is already lit, instead of slave 26 and 28, slaves 26B and 28B are indicated.

LED reaction depending on the operating mode

The LED reaction in “Slave display” mode depends on the operating mode.

- **Configuration mode**

  If the Link is in configuration mode, all detected AS-i slaves are indicated by the relevant LEDs lighting up.

- **Protected mode**

  If the Link is in protected mode, all active AS-i slaves are indicated by the relevant LEDs lighting up.

  The following slaves are indicated in protected mode by the flashing of the relevant LEDs:

  - Failed AS-i slaves
  - Existing but unconfigured AS-i slaves

For the meaning of the operating mode, refer to Section 1.9.1.

1.8.4 Displaying and setting the PROFIBUS address

Interpreting the PROFIBUS address display

By repeatedly pressing the ”DISPLAY” button, you change from the slave display to the PROFIBUS address display.

If the “ADR” LED is lit, the lower row of LEDs indicates the PROFIBUS address of the DP/AS-i Link 20E. The PROFIBUS address is shown in binary.

You can now set the PROFIBUS address with the ”SET” button.

Setting the PROFIBUS address

Follow the steps outlined below to set the PROFIBUS address:

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 of the DP/AS-i Link 20E by pressing the “DISPLAY” button repeatedly until the “ADR” LED lights up.

   The DP/AS-i Link 20E then indicates the currently set PROFIBUS address using the seven right-hand LEDs of the lower row.

3. If you now press the “DISPLAY” button, the DP/AS-i Link 20E returns to the slave 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.

   Initially, the flashing LED (second LED from left) shows the most significant bit of the PROFIBUS address.

4. When you press the “SET” button, this bit is set (LED on).

   In contrast, if you press the “DISPLAY” button, the bit is reset (LED off).

   The display then moves on to the next LED (third LED from the left) the 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 flashes.

   If you press the SET button again, the set PROFIBUS address is adopted by the DP/AS-i Link 20E .

   If, on the other hand, you press “DISPLAY” the new address is discarded.

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

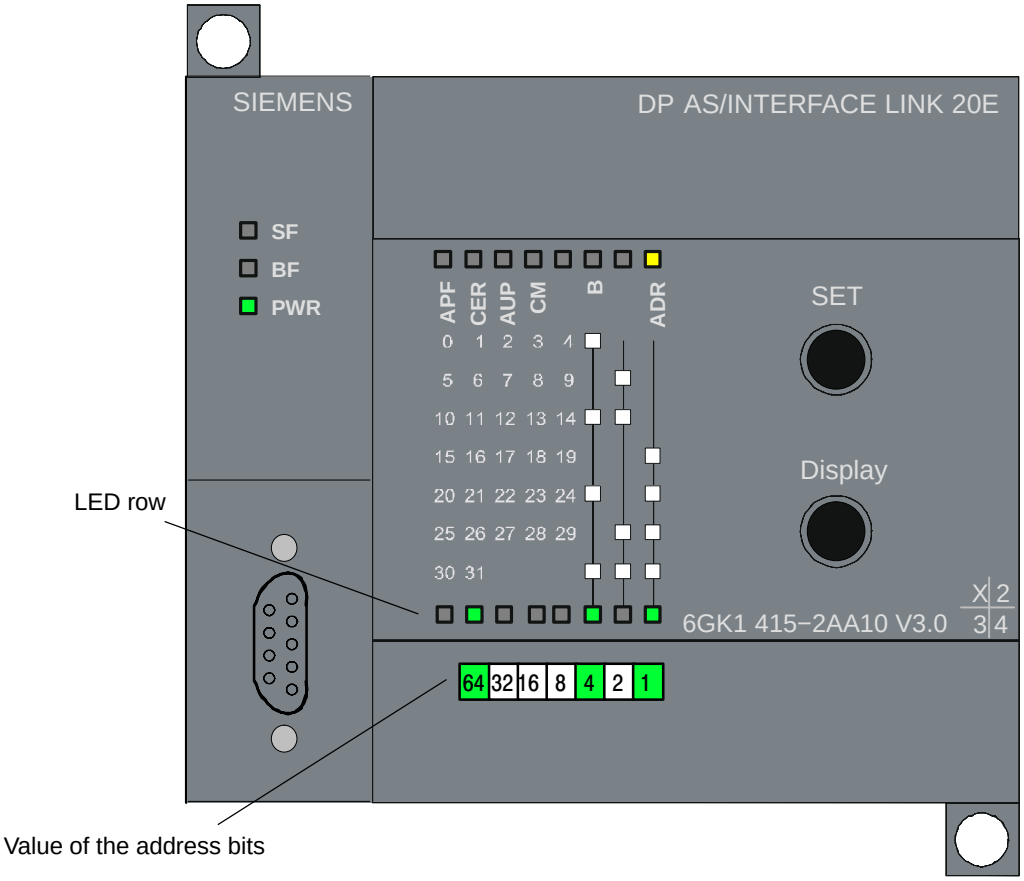


Figure 1-5 Example of a displayed PROFIBUS address

In the example above, the SET/DISPLAY buttons were used to set the PROFIBUS address 69 (64 + 4 + 1 = 69).

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

Switching back to the slave display

Press the “Display” button until the “ADR” KED is no longer lit. You are then in the slave display again.

If you do not press the “DISPLAY” button for approximately 8 minutes or do not make any entries with the “SET” button, the display automatically changes to the slave display again.

1.9 Configuring the AS-Interface with the SET button (push button configuration)

Meaning of push button configuration

This type of configuration allows you to commission the DP/AS-i Link 20E quickly and with little effort.

If you want to configure the AS-Interface using STEP 7 (see Section 1.10), you can skip this section.

1.9.1 “Configuration mode” and “protected mode”

Recognizing the operating mode

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

- Configuration mode
- Protected mode

When you press the SET button, the operating 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 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 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-i Link 20E:

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

Protected mode

In protected mode, the DP/AS-i Link 20E exchanges data only with the configured AS-i slaves. ”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 20 match the values of the existing AS-i slaves.

1.9.2 Configuring using push buttons

Preparing to configure by push button

Make sure that the following situation applies:

- The data exchange between the DP master and DP/AS-i Link 20E is interrupted or the DP master is in the STOP mode.
- The DP/AS-i Link 20E 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 must not be in the PROFIBUS address display mode; in other words, when the SET button is pressed, the “ADR” LED display must not light up.

Configuring by push button

1. Check whether the DP/AS-i Link 20E 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.
2. 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.
3. Press the SET button. This configures the DP/AS-i Link 20E, in other words, the detected actual configuration of the DP/AS-i Link 20E is stored permanently as the default in EEPROM. At the same time, the DP/AS-i Link 20E 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 after configuration matches the existing “actual configuration” on the AS-Interface.

Note

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.

1.10 Configuring the DP/AS-i Link 20E as DP slave on the DP master

Significance of the configuration

Communication with the DP slaves differs depending on the device you use as DP master. Generally, the information relating to the structure of the DP master system is set during configuration.

This section explains the following aspects of this DP configuration on the DP master:

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

1.10.1 General procedure

Available configuration tools

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

Configurable modes and performance characteristics of the DP master

The following table lists the essential performance characteristics of the possible DP master modes according to DPV0 and DPV1 (see also Section 1.2)

Table 1-4

Functions available via the AS-i Link 20E	DPV0 mode	DPV1 mode
Access to digital I/O data	X	X
Access to AS-i analog values according to the AS-i specification 3.0	−	X
AS-i command interface	−	X

Configuring the DP master

If you use a SIMATIC S7 CPU as the DP master, use SIMATIC STEP 7 for the configuration and take the DP/AS-i Link 20E from the hardware catalog.

If you use another DP master, use the GSD file supplied on the CD to configure DP/AS–i Link 20E.

GSD file

The GSD files contain the information on the DP/AS–i Link 20E that is required by the configuration tool you decide to use (STEP 7 or third−party tool).

The GSD files are on the CD that ships with the product.

The GSD files are also available at the following Internet address:

http://support.automation.siemens.com/WW/view/en/113250

The GSD file for the DP/AS–i Link 20E exists in two file formats:

- **SIEM8098.GSD**

  Use this file for the following modes of the DP/AS-i Link 20E:

  − DPV0 mode

  − DPV1 mode when necessary, for example use as a spare part

- **SI018098.GSx**

  The last letter ”x” is the language identifier of the file.

  Use this file for the following modes of the DP/AS-i Link 20E:

  − DPV1 mode

  − DPV0 mode when necessary:
  The Link does not then supply any diagnostic messages if AS-i errors occur.

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 CD.

1.10.2 Importing the 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**

  Here, you can choose between the following:

  − Max. 16/16 bytes (general identifier 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.

  − Max. 32/32 bytes (special identifier 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 digital data interface of the DP/AS–i Link 20E.

  − Universal module

    This configuration is not required on the DP/AS–i Link 20E.

- **Device-specific DP parameter assignment when using the GSD file “SI018098.GSx”**

  When assigning parameters to the DP/AS–i Link 20E, you can set the device−specific operating parameters (the AS-i parameters) for all AS-i slave addresses.

  AS-i parameters are used by the DP/AS-i Link 20E when the AS-i slaves are activated.

- **Device-specific DP parameter assignment when using the GSD file “SIEM8098.GSx”**

  You can choose between the following device−specific operating parameters:

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

    The ”DPV1 disable” mode is preset with these operating parameters. With this setting, **no** acyclic data transfer is possible!

    If you want to use the command interface and analog data transfer with AS−Interface, you will need to select ”DPV1 = enable”.

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

    With these operating parameters, the ”Diagnostics Alarm enable” mode is preset. With this setting, the DP/AS Interface Link 20E triggers diagnostic interrupts if an error occurs.

    If you want to disable this response, select ”Diagnostics Alarm = disable”

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

    Set this operating parameter to enable if you are using an S7 device as the DP master and if you configure the master with STEP 7 V5.0 SP2 or lower.

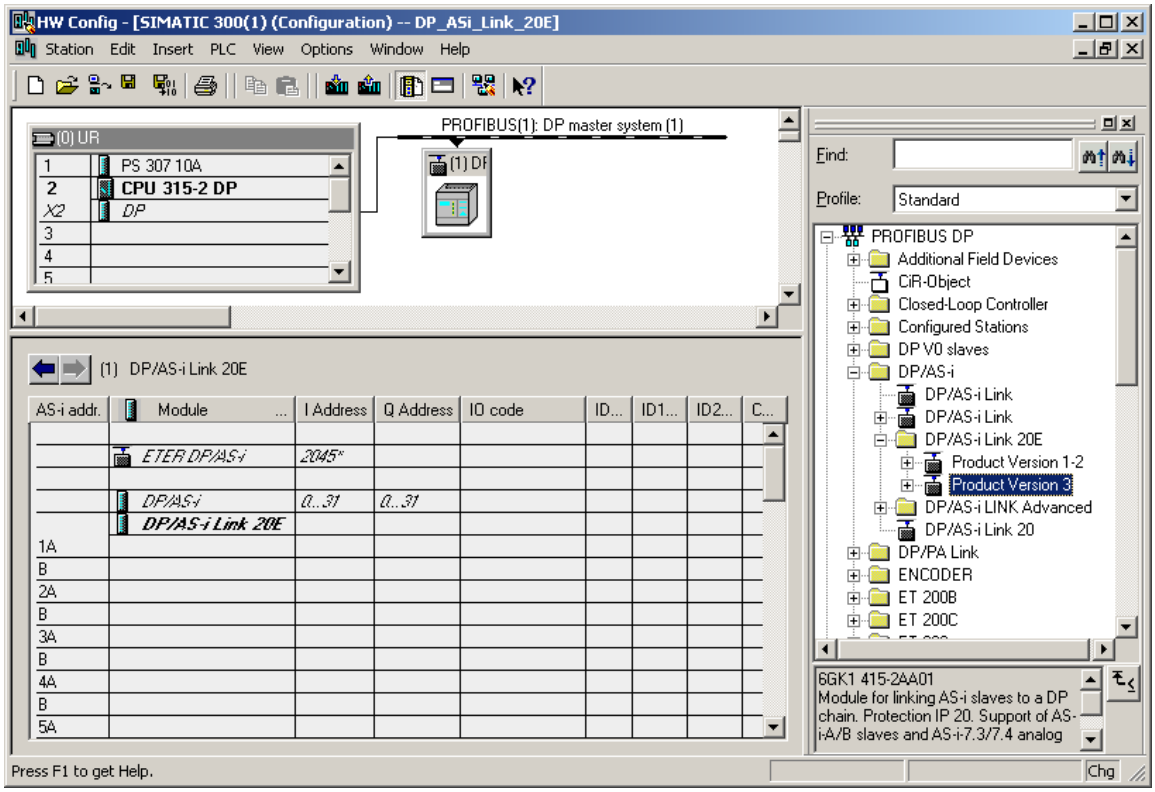
Caution

If you use a DPV0 master, leave the setting “DPV1−disable”! Otherwise, this can lead to deactivation of the I/O transfer if AS-i errors occur.

1.10.3 Configuration in STEP 7 − basic configuration

Configuring the DP master system

Just like every other DP slave, the DP/AS-i−Link 20E is taken from the hardware catalog in STEP 7 HW Config 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 visible in the detailed view of the station window. In this default setting, the rules of “**button configuration**” apply initially (see Section 1.9).

Configuring the properties of the DP slave

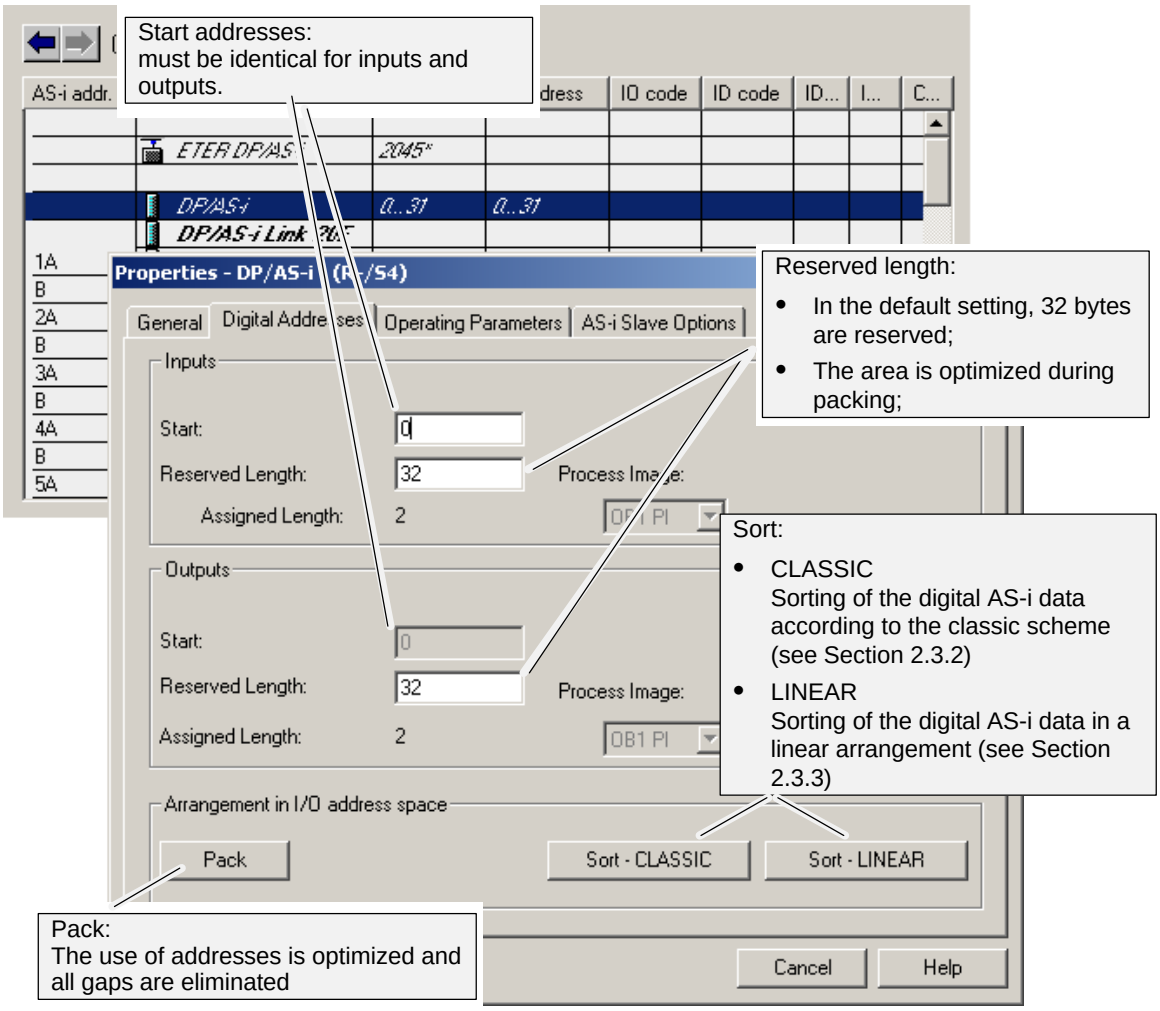
To configure general information, addresses and operating parameters, change to the properties dialog of the DP/AS-i Link 20E.

The settings you make in this dialog are adequate to commission a DP/AS-i Link 20E with a SIMATIC S7 DP master. All other configuration information relating to the AS-i slaves can be stored on the DP/AS-i Link 20E using the button configuration (see Section 1.9).

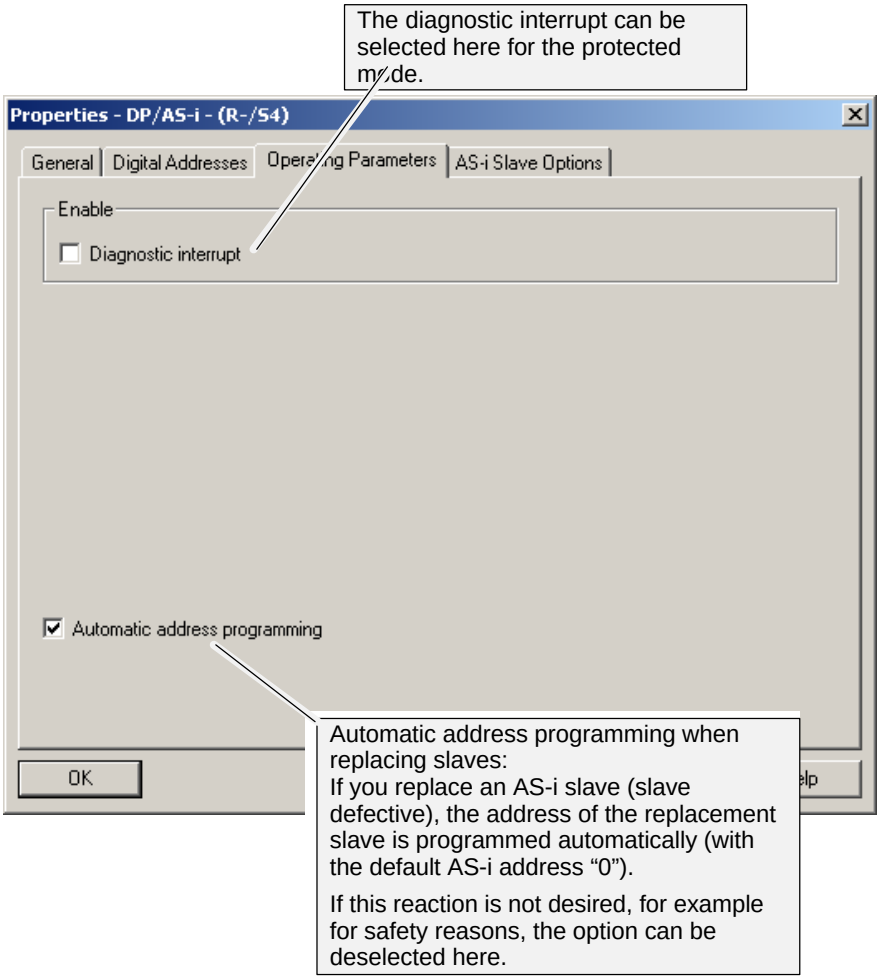
If you want to set a more detailed AS-i configuration with STEP 7, follow the instructions in the next section 1.10.4.

- “Digital Addresses” tab

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



- ”Operating Parameters” tab



1.10.4 Configuration in STEP 7 − slave configuration

Meaning

A complete AS-i configuration in STEP 7 as described below allows you adapt the AS−Interface ideally to the I/O address space of SIMATIC S7.

The settings you have made already in the basic configuration are adequate to commission a DP/AS-i Link 20E with a SIMATIC S7 DP master. All other configuration information relating to the AS-i slaves can then be stored on the DP/AS-i Link 20E using the button configuration (see Section 1.9).

If you want to set a more detailed AS-i configuration with STEP 7, follow the steps below.

Configuring AS-i slaves

To configure a special slave configuration, take the AS-i slaves from the hardware catalog and insert them in the detailed view of the station window in a selected row. This specifies the addresses of the AS-i slaves.

Notice

If you set the AS-i slave configuration with STEP 7, any existing button configuration on the DP/AS-i Link 20E is overwritten during the DP startup!

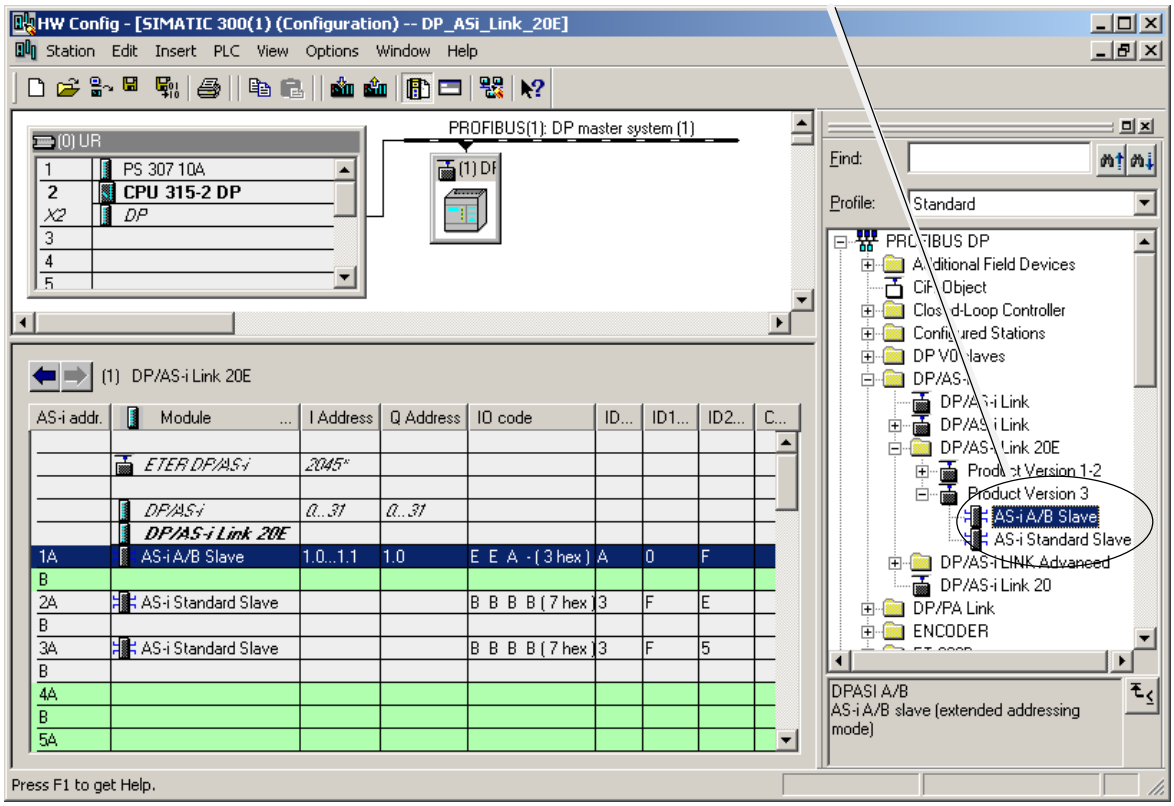
Two types of AS-i slave are available:

- 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 place an AS-i A/B slave at the same address in the B address area.



Configuring the properties of an AS-i slave

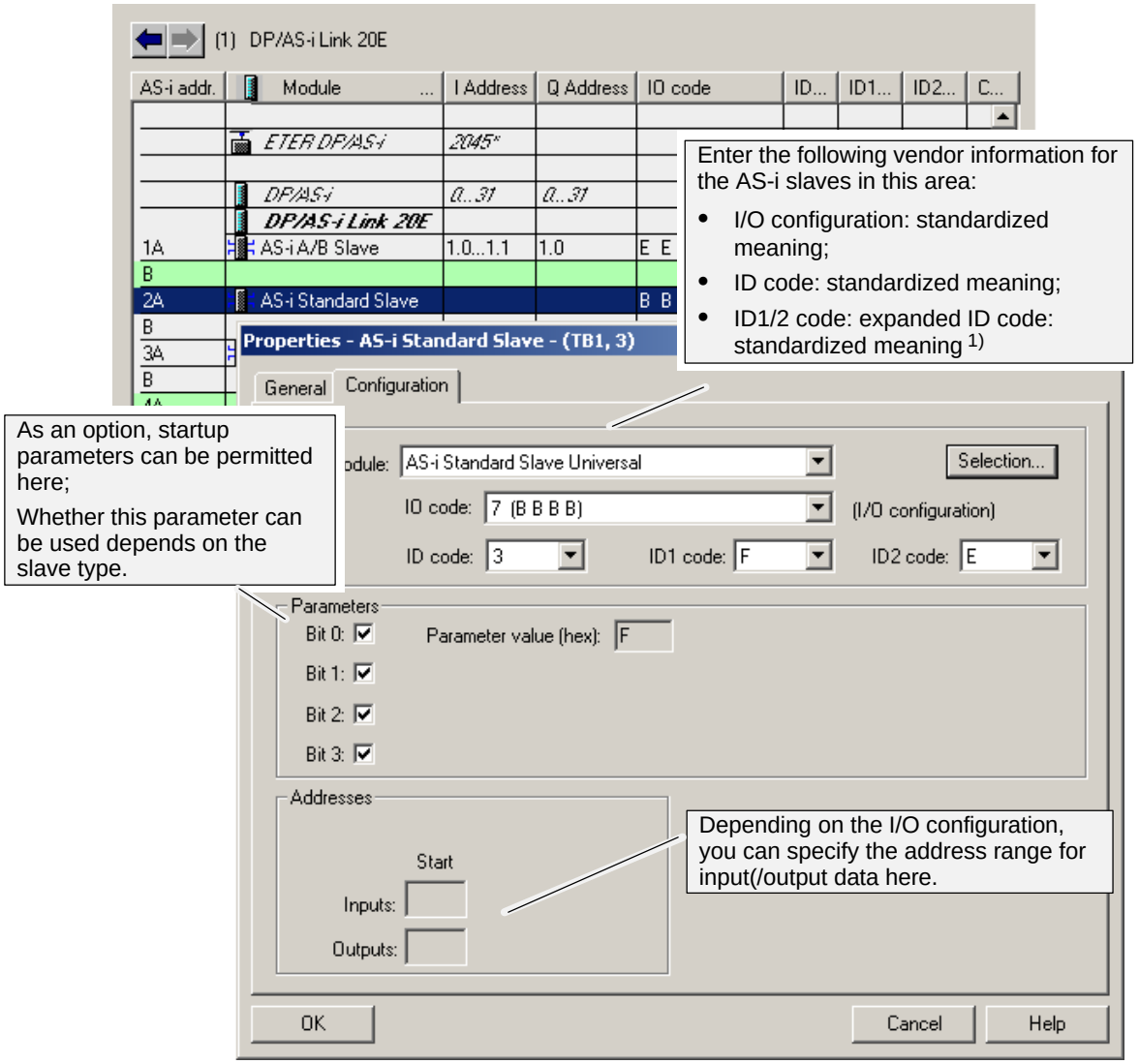
By configuring the properties of the AS-i slaves, you can do the following ...

- Storing general information for the AS-i slaves
- Enter configuration data of the AS-i slaves
- Specify the I/O configuration
- Specifying the I/O address ranges

If you use Siemens slaves, you can select the required AS-i slave with ”Module” or with ”Selection” in the properties dialog of the slave in the “Configuration” tab. These slaves already have their parameter assignment. The relevant parameters cannot be edited, the startup parameters can be set in plain language.

Standard AS-i slave

The AS-i standard slave can only be placed at an AS-i address in the A area. This address is then no longer available in the B area.



1) For AS-i slaves that do not support the ID1/ID2 codes, the values F_H must be entered.

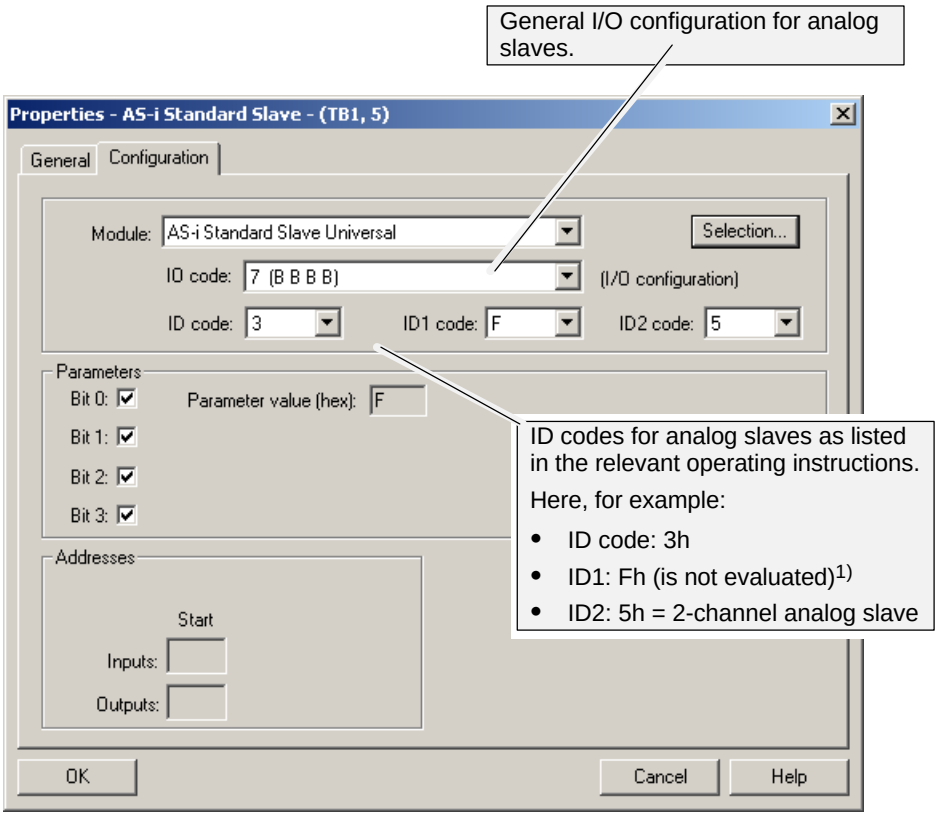
Configuring analog slaves as standard slaves

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

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

These parameters are set in accordance with the DP standard V1.

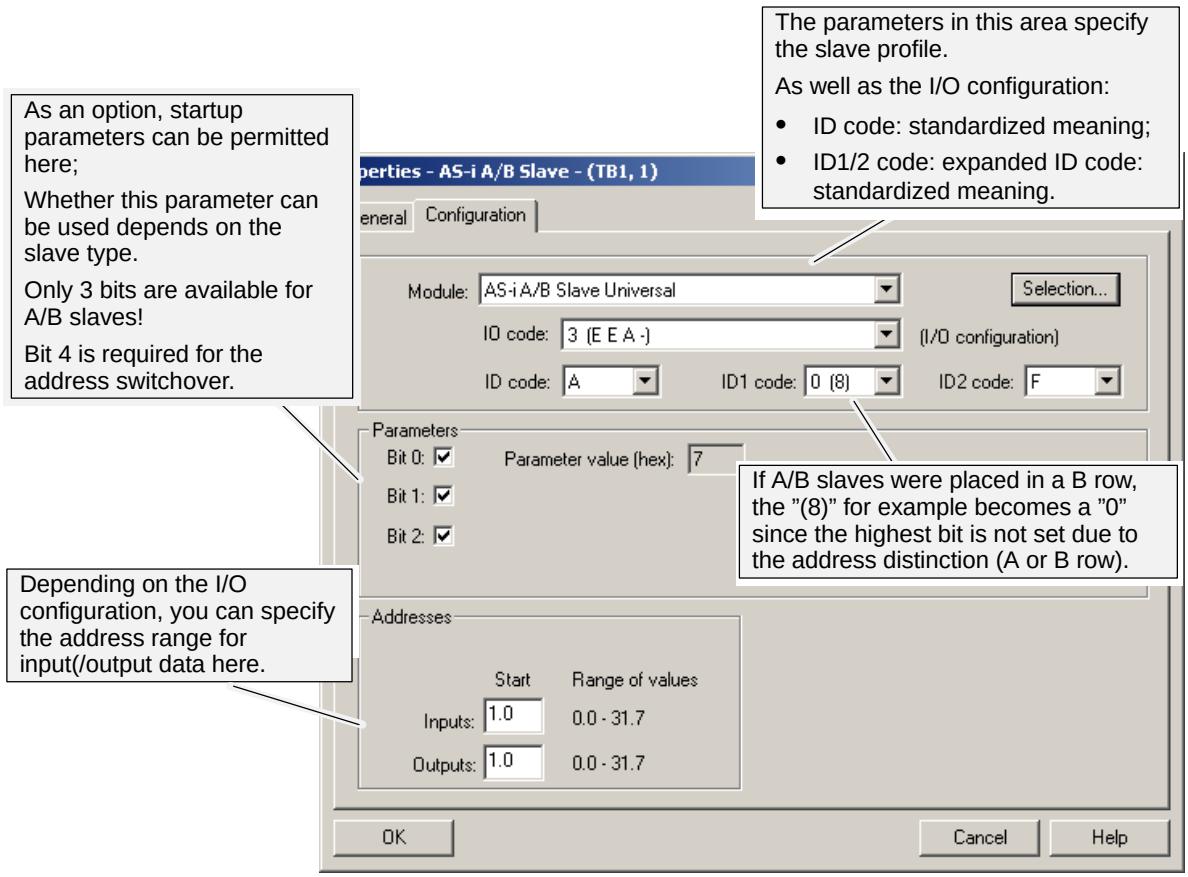
Example:



1) For AS-i slaves that do not support the ID1/ID2 codes, the values F_H must be entered.

AS-i A/B slave

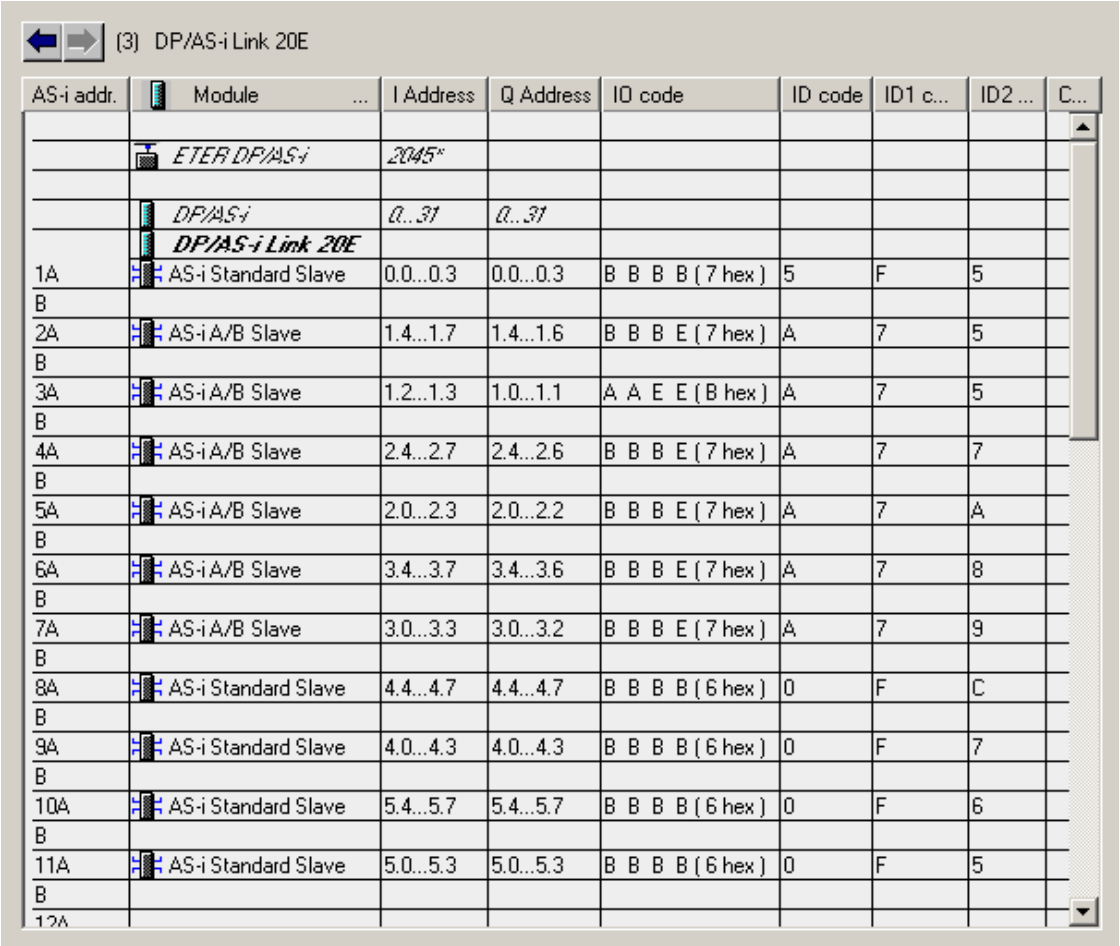
The AS-i A/B slave can either be placed at an AS-i address in the A or B area. The B area can be used only when no AS-i standard slave is placed in the A area.



Slaves complying with AS-i specification V3

AS-i slaves complying with AS-i Specification V3 (combined transaction type (CTT) 2−5) are supported by the DP/AS-i Link 20E as of firmware version V3.0. You can access the analog values of these slaves using data records 140 to 147.

The following figure shows an example of the configuration table STEP 7 / HW Config of a DP/AS–i Link 20E with configured CTT slaves:



(3) DP/AS-i Link 20E

AS-i addr.	Module ...	I Address	Q Address	IO code	ID code	ID1 c...	ID2 ...	C...
	ETER DP/AS-i	2045*						
	DP/AS-i	0...31	0...31					
	DP/AS-i Link 20E							
1A	AS-i Standard Slave	0.0...0.3	0.0...0.3	B B B B (7 hex)	5	F	5	
B								
2A	AS-i A/B Slave	1.4...1.7	1.4...1.6	B B B E (7 hex)	A	7	5	
B								
3A	AS-i A/B Slave	1.2...1.3	1.0...1.1	A A E E (B hex)	A	7	5	
B								
4A	AS-i A/B Slave	2.4...2.7	2.4...2.6	B B B E (7 hex)	A	7	7	
B								
5A	AS-i A/B Slave	2.0...2.3	2.0...2.2	B B B E (7 hex)	A	7	A	
B								
6A	AS-i A/B Slave	3.4...3.7	3.4...3.6	B B B E (7 hex)	A	7	8	
B								
7A	AS-i A/B Slave	3.0...3.3	3.0...3.2	B B B E (7 hex)	A	7	9	
B								
8A	AS-i Standard Slave	4.4...4.7	4.4...4.7	B B B B (6 hex)	0	F	C	
B								
9A	AS-i Standard Slave	4.0...4.3	4.0...4.3	B B B B (6 hex)	0	F	7	
B								
10A	AS-i Standard Slave	5.4...5.7	5.4...5.7	B B B B (6 hex)	0	F	6	
B								
11A	AS-i Standard Slave	5.0...5.3	5.0...5.3	B B B B (6 hex)	0	F	5	
B								
12A								

Figure 1-6 Configuration table of a DP/AS–i Link 20E in HW Config (example)

Not all bits of the I/O addresses of the CTT slaves!

In the corresponding digital values, STEP 7 does not indicate the correct number of bits. Access to the user data by the user program is nevertheless possible. Exception: With an AS-i slave according to profile S−7.A.7, output bit D3 cannot be used.

Table 1-5 shows the relevant bits of the CTT slaves.

Table 1-5

Slave in the example (see figure)	**Type, IO.ID.ID2**	**Relevant bits**	**Non-relevant bits**
Slave 1A	CTT2, S-7.5.5	I0.0...I0.1 Q0.2...Q0.3	I0.2...I0.3 Q0.0...Q0.1
Slave 2A	CTT2, S-7.A.5	I1.4...I1.5 Q1.6	I1.6...I1.7 Q1.4...Q1.5
Slave 3A	CTT2, S-B.A.5	−	All bits irrelevant. Data access to analog data via data record 140...147.
Slave 4A	CTT3, S−7.A.7	I2.4...I2.7 Q2.4...Q2.6	Output bit D3 of the slave cannot be used.
Slave 5A	CTT3, S−7.A.A	−	All bits irrelevant. Data access to analog data via data record 140...147.
Slave 6A	CTT4, S−7.A.8	Q3.6	I3.4...I3.7 Q3.4, Q3.5, Q3.7 Data access to analog data via data record 140...147.
Slave 7A	CTT4, S−7.A.9	−	All bits irrelevant. Data access to analog data via data record 140...147.
Slave 8A, 9A, 10A, 11A	CTT5, S-6.0.x	−	All bits irrelevant. Data access to analog data via data record 140...147.

Note

Slaves with IO code 6 and ID code 0 occupy several AS-i addresses. The IO and ID code specified by the vendor must be configured for each occupied AS-i address.

1.10.5 Uploading the actual configuration

Aims

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

This allows you to

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

Notice

The uploaded configuration is always the current actual configuration.

The actual configuration can deviate from the configuration stored on the AS-i master, for example when an AS-i slave is added or removed following configuration.

The “Upload to PG” function is not possible with some configurations (for example when using the CP 342–5).

Follow the steps below

Preparation: Creating and downloading a 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 using HW Config.

Uploading:

3. The select the “AS-i Slave Options” tab
4. Click the “Upload to PG” button.

   An existing engineered configuration is overwritten. Before the new configuration is adopted, you must first confirm the warning.
5. Change to the “Slave Configuration” tab to view the actual configuration and edit it if necessary.

❑

Data exchange between DP master and AS-i slave

2

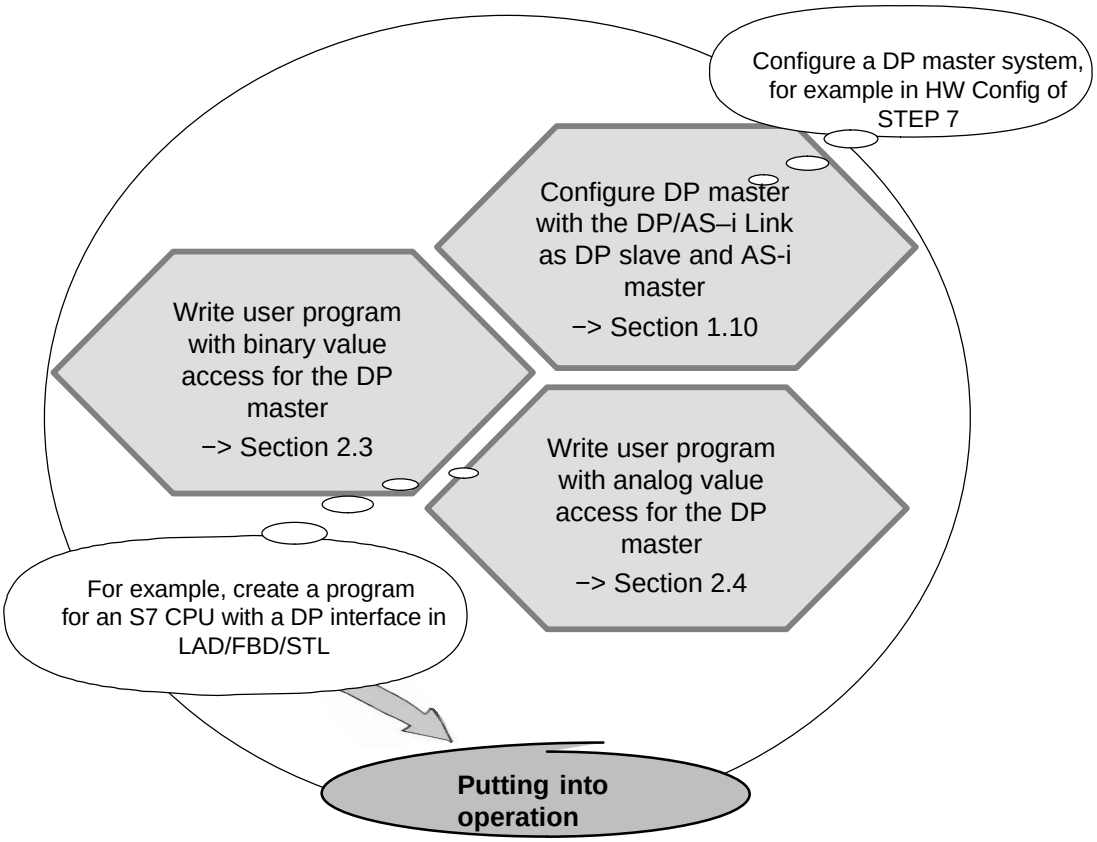
This chapter contains the information you require to access the AS-Interface from the DP/AS-i Link 20E from the DP master.

The chapter explains the transfer of the following:

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

2.1 Steps involved − an overview

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



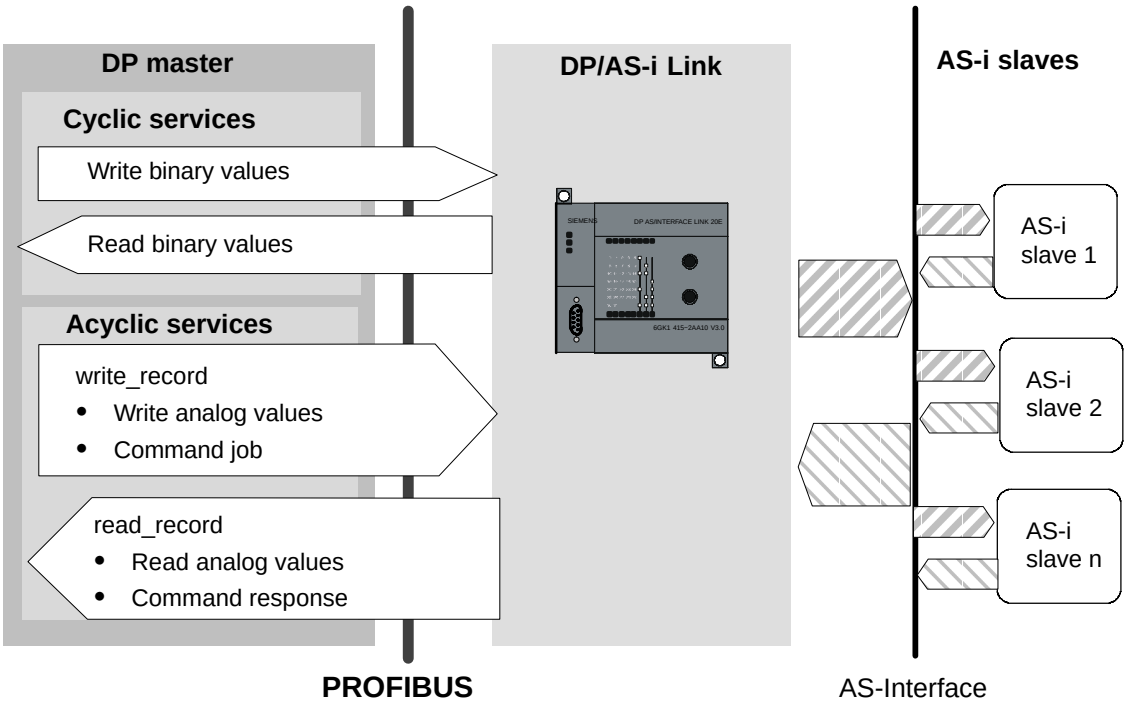
2.2 How the interfaces work

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 needs to operate two interfaces:

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



Interface to the DP master : PROFIBUS DP

At the PROFIBUS end, the cyclic services and 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

  These services are called read_record and write_record below. They are used for

  - Transfer of analog values
  - Controlling the command interface

2.3 Transferring AS-i binary values

Meaning

This section explains how to access the binary values of connected AS-i slaves from the user program on the DP master.

Interface between DP master and DP/AS-i Link 20E

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

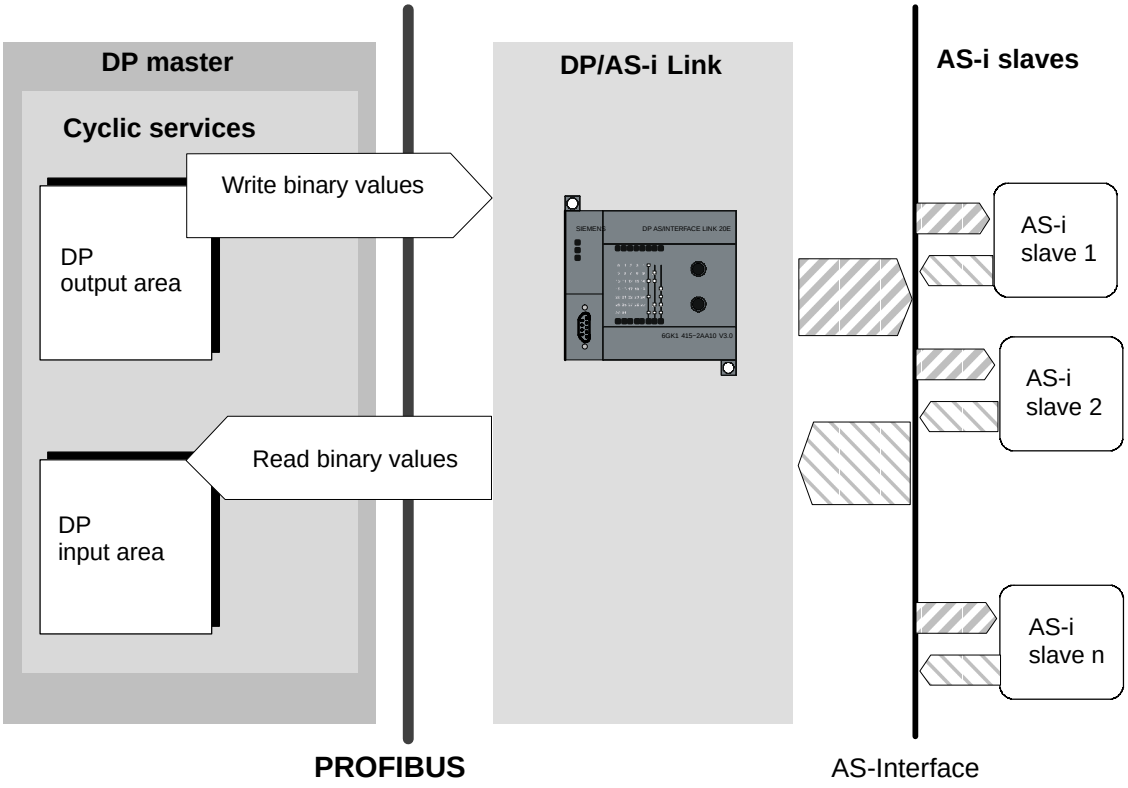


Figure 2-1

From the perspective of the PROFIBUS DP master, the DP/AS-i Link 20E occupies the following

- Maximum of 32 input bytes and 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 below. For more detailed information, refer to /3/ and the manuals for your PROFIBUS DP master.

2.3.1 Addressing AS-i slaves

Interface to the AS-i slaves

The DP/AS–i LINK 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 in AS-i input or output data on the DP master

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

The assignment of the I/O bits relating to the slave addresses depends on the configuration.

The following sortings are possible:

- CLASSIC
- LINEAR
- Packed

2.3.2 CLASSIC addressing table (default)

The CLASSIC sorting is used:

- When configuring using a GSD file
- If no AS-i slaves are configured with STEP 7
- If AS-i slaves configured with STEP 7 are sorted according to the CLASSIC scheme

Byte Number *)	Bit 7-4	Bit 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

Byte Number *)	Bit 7-4	Bit 3-0
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
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 30B 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 and are reserved for the command interface of the DP/AS-i LINK (see Section 3.1).
Bits 4−7 in the first byte of the **output** data have no further meaning and are also reserved.

Hiding I/O addresses

Unused I/O addresses at the back end of the table can be hidden during DP configuration (for example in the STEP 7 configuration using the “Reserved length” parameter (See Section 1.10.3).

Example (classic sorting):

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

If you use a GSD configuration, you can use the binary module “Binary Array 16”.

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 address m = 0 is used for the I/O data.

The bits relevant for the user program of 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.

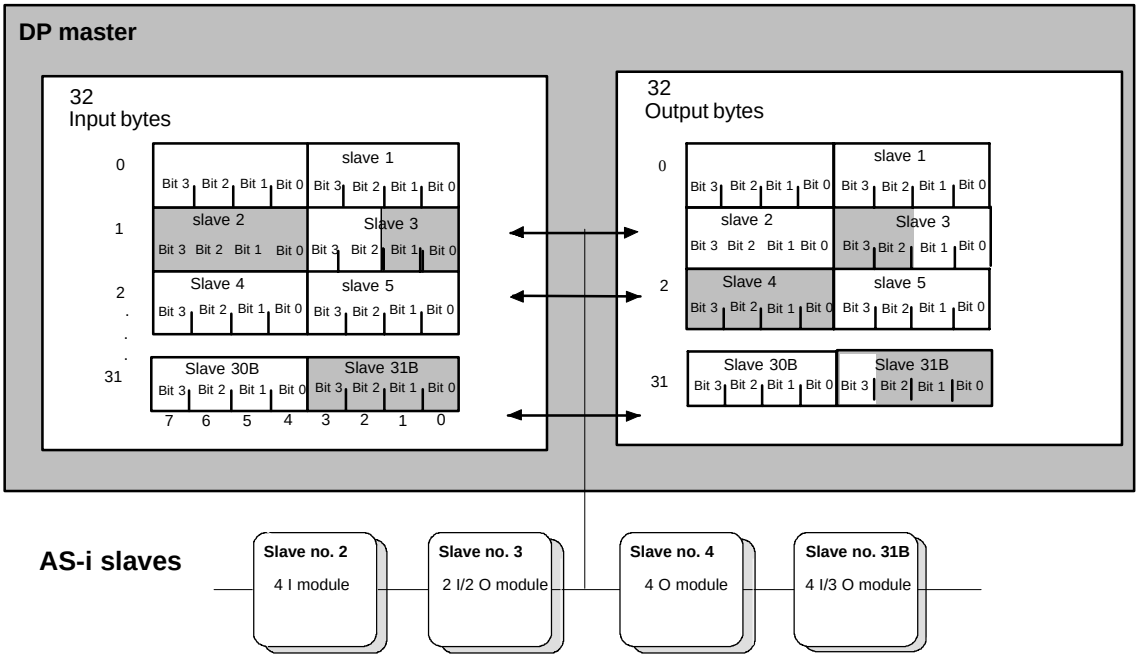
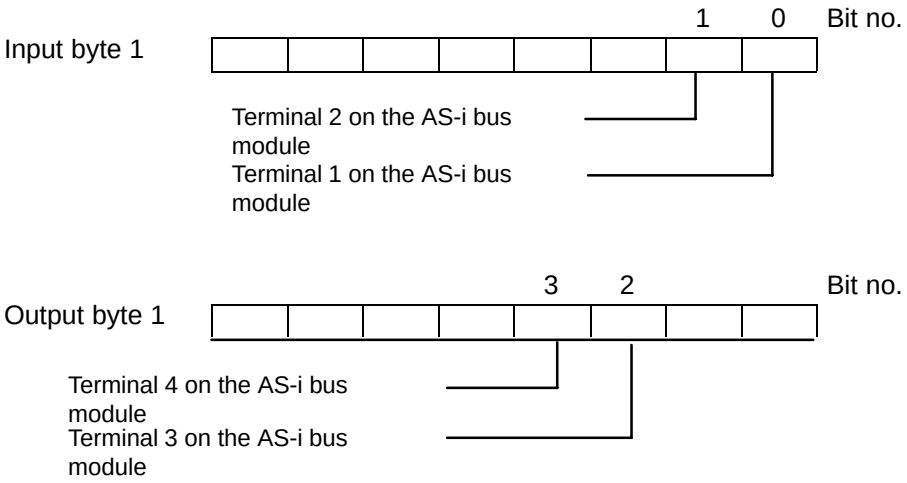


Figure 2-2

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:



2.3.3 LINEAR addressing table

Byte Number *)	Bit 7-4	Bit 3-0
m+0	Status Nibble **)	reserved Bit 3 | Bit 2 | Bit 1 | Bit 0
m+1	Slave 1B	Slave 1 or 1A
m+2	Slave 2B	Slave 2 or 2A
m+3	Slave 3B	Slave 3 or 3A
m+4	Slave 4B	Slave 4 or 4A
m+5	Slave 5B	Slave 5 or 5A
m+6	Slave 6B	Slave 6 or 6A
m+7	Slave 7B	Slave 7 or 7A
m+8	Slave 8B	Slave 8 or 8A
m+9	Slave 9B	Slave 9 or 9A
m+10	Slave 10B	Slave 10 or 10A
m+11	Slave 11B	Slave 11 or 11A
m+12	Slave 12B	Slave 12 or 12A
m+13	Slave 13B	Slave 13 or 13A
m+14	Slave 14B	Slave 14 or 14A
m+15	Slave 15B	Slave 15 or 15A
m+16	Slave 16B	Slave 16 or 16A
m+17	Slave 17B	Slave 17 or 17A
m+18	Slave 18B	Slave 18 or 18A
m+19	Slave 19B	Slave 19 or 19A
m+20	Slave 20B	Slave 20 or 20A
m+21	Slave 21B	Slave 21 or 21A
m+22	Slave 22B	Slave 22 or 22A
m+23	Slave 23B	Slave 23 or 23A
m+24	Slave 24B	Slave 24 or 24A
m+25	Slave 25B	Slave 25 or 25A
m+26	Slave 26B	Slave 26 or 26A
m+27	Slave 27B	Slave 27 or 27A
m+28	Slave 28B	Slave 28 or 28A
m+29	Slave 29B	Slave 29 or 29A
m+30	Slave 30B	Slave 30 or 30A
m+31	Slave 31B Bit 3 | Bit 2 | Bit 1 | Bit 0	Slave 31 or 31A 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.
Bits 0−3 in the first byte of the input data have no further meaning and are reserved.
Bits 0−7 in the first byte of the output data have no further meaning and are also reserved.

2.3.4 Packed addressing table

The “Pack” function in the properties dialog of the AS-i line is used to optimize the use of addresses, in other words, all gaps are eliminated (see Section 1.10.3).

You can take the addresses of the binary data directly from the configuration.

2.3.5 Special feature of AS-i analog slaves

If you use slaves complying with CTT 1-5, then depending on the slave, all or some I/O bits may be used for special transfer functions.

The following applies to these protocol bits:

- In the input direction, the DP/AS–i LINK sets the value “0”;
- In the output direction, the DP/AS–i LINK ignores the bits;

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

2.3.6 Points to note about AS-i safety slaves

The DP/AS-i LINK sets the input bits

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

2.3.7 Accessing AS-i digital data

The DP master is the decisive factor

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

SIMATIC S7 is 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 binary values with single bit commands.

Example (see also Figure 2-2):

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

2.4 Transferring AS-i analog values

Meaning

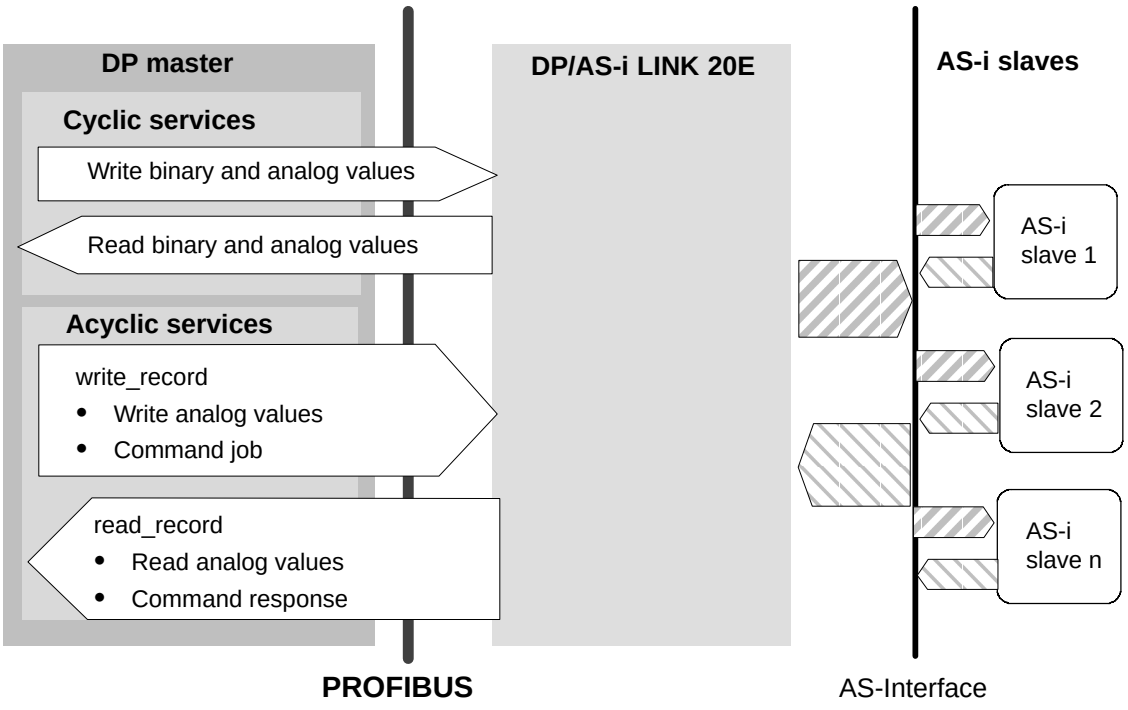
This section explains how to access the analog values of connected AS-i slaves from the user program on the DP master.

Notice

The following listings apply only to AS-i slaves that handle analog value transfer according to the AS-i slave profile 7.3, 7.4, 7.5.5, 7.A.5, B.A.5, 7.A.A, 7.A.8, 7.A.9 or 6.0 (Combined Transaction Types CTT 1−5 according to AS-i Specification V3.0).

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

Analog interface between DP master and DP/AS-i Link 20E



2.4.1 Calling the acyclic services

DP master with acyclic services

The acyclic services according to the DP standard DP-V1 for PROFIBUS DP allow not only cyclic data transfer but also other jobs for sending output data to the DP slaves or for acquiring (receiving) input data of the DP slaves.

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

- Reading/writing analog values
- Command interface (see Chapter 2)

Calls

Table 2-1

Call	With SIMATIC S7	With 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 name of these parameters and the type of parameter assignment can vary depending on the type of DP master.

The following table provides an overview of the parameters of the DP-V1 specification and, as an example, their mapping to the parameter assignment in a user program for a SIMATIC S7 CPU and a user program for PC/PG 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 1.10). The S7 CPU calculates the PROFIBUS address from this output.)	C_Ref	PROFIBUS address of DP/AS-i Link (DP slave)
	IOID The following fixed value needs to be entered here: B#16#54	−	Fixed value
Slot_number	Calculated from LADDR; no SFC parameter	Slot_number	on DP/AS-i Link 20E: any value
Index	RECNUM	Index	The DP/AS-i Link 20E supports the following record numbers: • 1 diagnostic record (reading) • 2 command interface • 140−147 (analog value access)
Length	RECORD Referenced via ANY pointer	Length_s	Length of the input/output data area
Data	RECORD Referenced via ANY pointer	Data_s	Address of the input/output data area
	RET_VAL BUSY		Return parameter for verification of execution

You will find programming examples for SIMATIC S7 in Section 2.4.3

2.4.2 Programming

Job parameters

Set the parameters 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:
  Decides the record number in the analog values are stored on the DP/AS-i Link 20E. How to use the available record numbers 140 to 147 is described below.
- Length
  Specifies the length of the input/output data area; the specified length must be adapted to the record being used and the address area of the analog slaves. You will find further explanations and examples below.
- Data:
  Decides the address of the input/output data area in which your user program accesses the analog values or provides the analog values.

There are examples of calls at the end of this chapter.

Data consistency

The analog values from or to the DP master are always consistent relative to one analog channel.

Mapping the analog values in the records

For analog value access, you can select one of the records 140 to 147. The records differ from each other in length. This allows you to optimize the data area to be reserved in your application if you use less AS-i analog slaves than the interface can support.

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

Note that slave address 31 is not used in record 140!

Table 1-1 below shows which address area in the selectable records the analog values of which AS-i slave are transferred to. How the analog values of an analog slave are mapped to the address areas is shown in the second 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 examples and notes on how to read the table.

Table 2-3 Accessing analog values using data records

	Start addresses for analog values in the 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

A/B − Analog slaves occupy only a maximum of 2 channels. The A slaves, in this case, occupy bytes 0−3 and the B slaves bytes 4−7.

Notes on how to read the table 2-3 (examples):

1. Configuration: analog slaves have 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 area 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 record 147 in a second job and specify 24 as the record length.

4. Configuration: analog slaves are located in the address area 29−31

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

Representation of the analog values

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

The transparent values are interpreted as two independent bytes.

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

Special situations in analog value transfer in the output direction

- With firmware version V2.x, the AS-i master interrupts the transfer of the analog output values when the CPU is in STOP. How the analog slave reacts depends on the particular device.
- As of firmware V3.0, the AS-i master sends the substitute value ”0” to all slaves when the CPU is in STOP.

Special cases when transferring analog values in the input direction

- In the input direction the AS-i returns the substitute value 7FFFh when
  - The AS-i slave has failed or does not exist
  - The channel number is not supported by the analog slave
  - The analog slave signals “Value Invalid”

  According to AS-i Specification 3.0, these are slaves with the following profiles:
  6.0.A to 6.0.C
  7.3.4 to 7.3.7
  7.3.B to 7.3.F
  7.4.1 to 7.4.F
  7.A.9
  7.A.8 (ID1 = 6)
  7.A.8 (ID1 = 7)
  7.A.5 and 7.5.5 and B.A.5
- Transparent data:

  In the input direction, the AS-i master returns the substitute value 0h when the analog slave supplies transparent data and when
  - This analog slave has failed or
  - This analog slave signals “Value invalid”

  According to the AS-i Specification 3.0, these are slaves with the following profiles:
  6.0.2 to 6.0.4
  7.3.0 to 7.3.3
  7.3.8 to 7.3.A
  7.A.A
  7.A.8 (ID1 = 3,4,5)

Note

On an S7 CPU; 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.

2.4.3 Programming examples

Example with SIMATIC S7

An analog value of AS-i analog slave 6 is transferred 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 cycl. 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 cycl. 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
```

Note

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.

2.5 PROFIBUS DP control commands

DP/AS-i Link 20E supports all the control commands provided 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 subsequent 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–i Link 20E updates this data once with each subsequent SYNC.
UNSYNC	The SYNC command is canceled.
CLEAR	The values of the binary output data forwarded by the DP/AS–i Link 20E to the AS-i slaves are set to ’0’ by the DP/AS–i Link 20E.

❑

Using the Command Interface 3

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 CD 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).

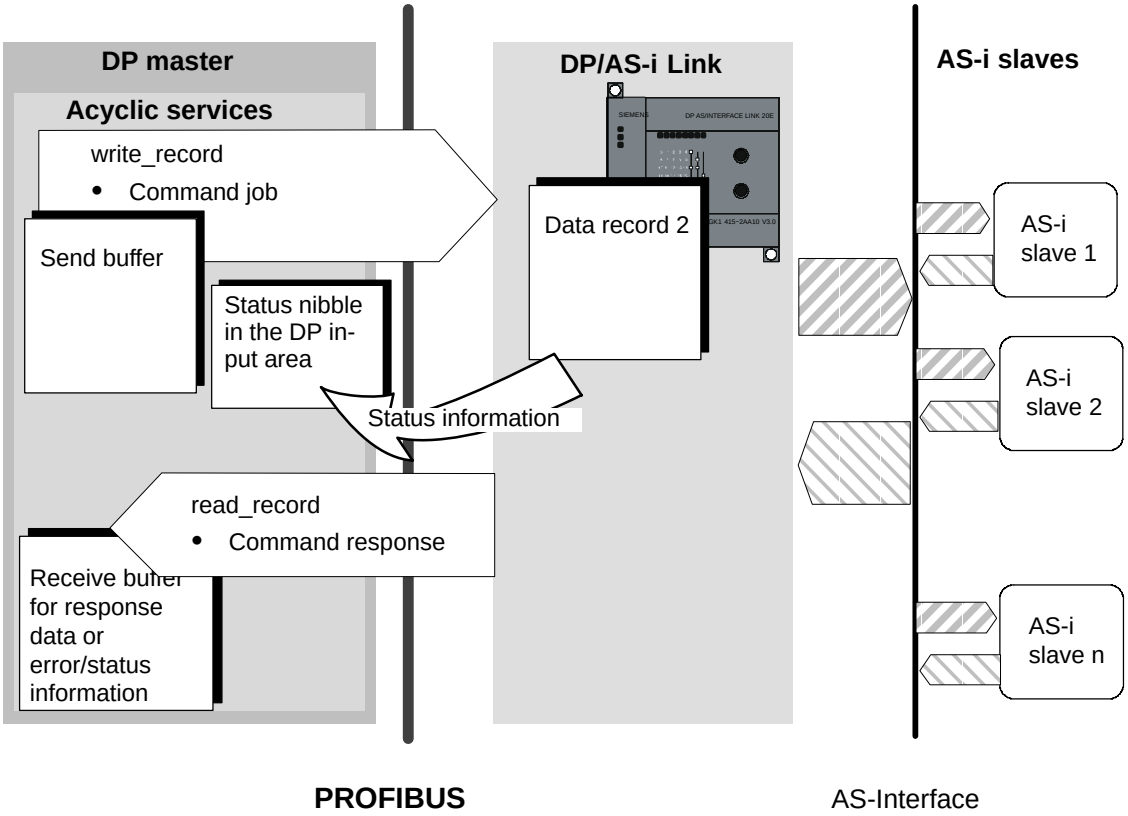


Figure 3-1

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.

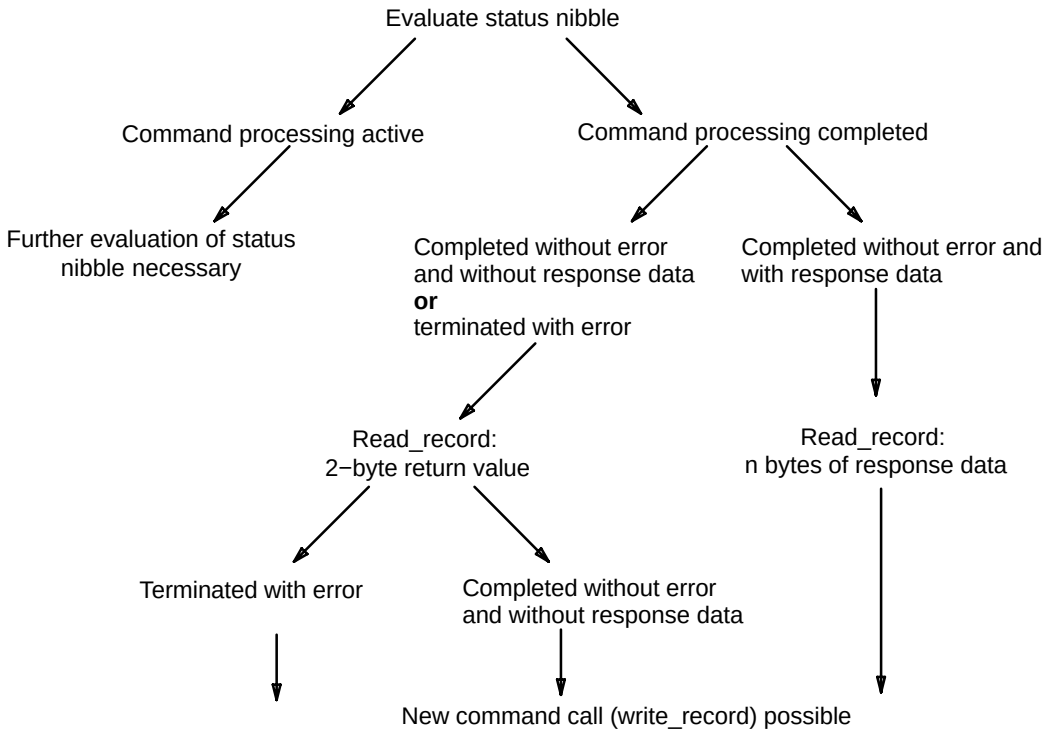


Figure 3-2

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
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

Table 3-1 Coding of the Status Nibble, continued

Status nibble (1st byte of the digital input data)				Meaning
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
8382_H	The AS-i slave is not activated (not in LAS).
8383_H	Error on AS-Interface.
8384_H	Command not permitted in the current status of the AS-i master.
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).
$83A1_H$	The addressed AS-i slave was not found on the AS-Interface.
$83A2_H$	An AS-i slave with address 0 exists.
$83A3_H$	An AS-i slave with the new address already exists on the AS-Interface.
$83A4_H$	The AS-i slave address cannot be deleted.
$83A5_H$	The AS-i slave address cannot be set.
$83A6_H$	The AS-i slave address cannot be 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

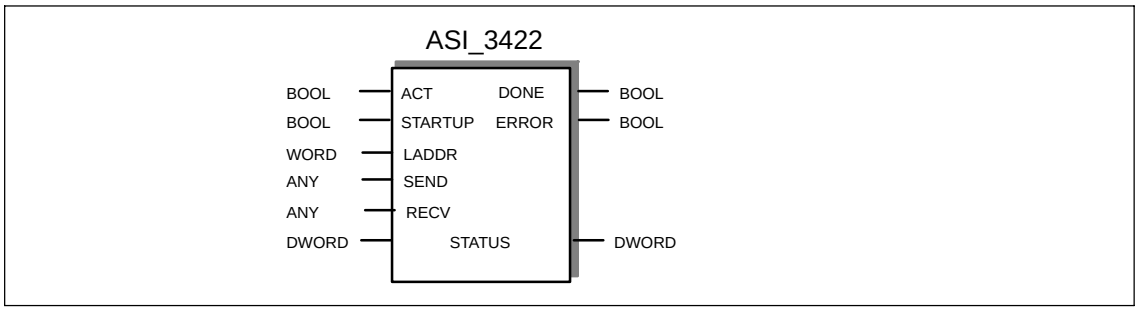


Table 3-4 Formal Parameters

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 CD 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.

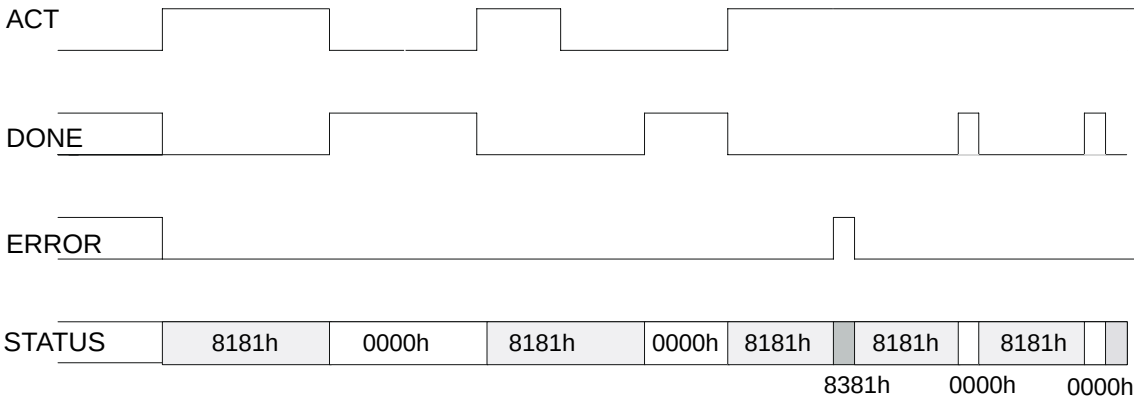


Figure 3-3

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.

Table 3-5 Error Coding, continued

DONE	ERROR	STATUS	Meaning
0	1	83A2$_H$	An AS-i slave with address 0 exists.
0	1	83A3$_H$	An AS-i slave with the new address already exists on the AS-Interface.
0	1	83A4$_H$	The AS-i slave address cannot be deleted.
0	1	83A5$_H$	The AS-i slave address cannot be set.
0	1	83A6$_H$	The AS-i slave address cannot be stored permanently.
0	1	83A7$_H$	Error reading the extended ID1 code.
0	1	83A8$_H$	The target address is not plausible (for example a B slave address was used for a standard slave).
0	1	83B1$_H$	A length error has occurred transferring a string according to profile 7.4.
0	1	83B2$_H$	A protocol error has occurred transferring a string according to profile 7.4.
0	1	83F8$_H$	The job number or the job parameter is unknown.
0	1	83F9$_H$	The AS-i master has detected an EEPROM error.
0	1	8F22$_H$	Area length area reading a parameter
		8F23$_H$	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	8F24$_H$	Area error reading a parameter
		8F25$_H$	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	8F28$_H$	Alignment error reading a parameter
		8F29$_H$	Alignment error writing a parameter This error code indicates that the reference to a parameter is a bit address other than 0.
0	1	8F30$_H$	The parameter is in the write-protected global DB
		8F31$_H$	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	8F32$_H$	The DB number in the parameter is too high
0	1	8F3A$_H$	The parameter contains the number of a DB that is not loaded
0	1	8F42$_H$	An access error has occurred while the system attempted to read out a parameter from the peripheral area of the inputs.

Table 3-5 Error Coding, continued

DONE	ERROR	STATUS	Meaning
0	1	$8F43_H$	An access error occurred while the system was attempting to write a parameter to the peripheral area of the outputs
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	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, configuration		25_H
Get_Extended_Permanent_Configuration −> described in section 3.3.7	Slave address	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, Address 2		$0D_H$
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		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
Read_Write_CTT2_request −> described in section 3.3.32	Slave address CTT2 string	CTT2 string	44_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	0	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	0	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	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	0	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	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	0	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	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	0	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	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	0	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			

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
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			

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

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
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	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	0	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			

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
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			

Byte	Meaning							
	Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
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			

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

3.3.32 Read_Write_CTT2_request

Meaning

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

With this call, a send buffer with a maximum of 223 bytes is transferred to the AS-i master. The actual number of string bytes to be sent to the AS-i slave is calculated by the AS-i master from byte 2 of the send buffer (number of string bytes).

The CTT2 request is replied to by the addressed AS-i slave with a CTT2 response. The AS-i master transfers this response as a byte string in the response buffer.

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

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

Structure of the Job Data in the Send Buffer

Byte	Meaning
0	Command number: 44_H
1	Slave address
2	Number of string bytes
3	String byte 1
4	String byte 2
...	**...**
...	String byte (n−1)
...	(String byte n)

Structure of the Response Data in the Receive Buffer

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

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 protected mode, the DP/AS-Interface Link 20E (DP/AS-i Link 20E) signals “diagnostics” whenever the configuration on the AS-Interface is changed. Configuration changes can be: 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

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

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 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 uses 28 bytes and is structured as follows:

Byte 0		Station status 1 to 3
Byte 1		
Byte 2		
Byte 3		DP master PROFIBUS address
Byte 4		High byte vendor ID
Byte 5		Low byte vendor ID
Byte 6		ID-related diagnostic information
Byte 7		
Byte 8		
Byte 9		Device-related diagnostic information
Byte 10		
Byte 11		
Byte 12		
Byte 13		
Byte 14		
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 to 7B	
Byte 25	Error in AS-i slave 8B to 15B	
Byte 26	Error in AS-i slave 16B to 23B	
Byte 27	Error in AS-i slave 24B to 31B	

4.2 Station status 1 to 3

Meaning

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: DP/AS-i Link 20E cannot be addressed by the DP master.	• Is the correct DP address set on the DP/AS-i Link 20E? • Bus connector connected? • RS-485 repeater set correctly? • External auxiliary voltage present on the DP/AS-i Link 20E?
	1	1: DP/AS-i Link 20E not yet ready for data exchange.	Has the DP/AS-i Link 20E already started up?
	2	1: Incorrect configuration data from the DP master. Required configuration is not supported by the DP/AS-i Link 20E.	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).
	4	1: Function not supported, e.g. changing the DP address of the DP/AS-i Link 20E by the DP master.	Check the configuration.
	5	1: The DP master cannot interpret the response from the DP/AS-i Link 20E correctly.	Check the PROFIBUS.
	6	1: 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: DP/AS-i Link 20E was assigned parameters by a different DP master from the DP master that currently has access to the DP/AS-i Link 20E.	This bit is always 1 if, for example, you are accessing the DP/AS-i Link 20E 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: DP/AS-i Link 20E 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.
	3	1: The response monitoring of the DP/AS-i Link 20E is activated.
	4	1: DP/AS-i Link 20E has received the ”FREEZE” control command.
	5	1: DP/AS-i Link 20E has received the ”SYNC” control command.
	6	0: This bit is always set to ’0’.
	7	1: DP/AS-i Link 20E 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.

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.
4	80_H	Vendor ID of the DP/AS-i Link 20E In slave diagnostics, byte 4 and byte 5 also include the Vendor ID of the DP/AS-i Link 20E.
5	98_H	

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	43_H	Header and length of the ID-related diagnostic information
7	xx_H	Each bit addresses a slot (bit 2^0 = slot 1; bit 2^1 = slot 2; ...) 0: Slot error-free 1: Slot has error
8	xx_H	

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 27 that signals the errors on the AS-Interface.

Byte	Value	Meaning
9	13_H	Header and length of the device-related diagnostic information
10	01_H 81_H	ID for diagnostic interrupt ID for status message
11	xx_H	Slot number of the module triggering the interrupt
12	01_H 02_H	Diagnostic event entering state Diagnostic event exiting state

Bytes 13 to 27 of the device-related diagnostic information contain error bits for errors on the AS-Interface. A delta list (bytes 20 to 27) 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: DP/AS-i Link 20E 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	Meaning
17	60_H	Fixed value
18	00H	Fixed value
19	40_H	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 to 7b
25	0..7	1: Error in AS-i slave 8B to 15B
26	0..7	1: Error in AS-i slave 16B to 23B
27	0..7	1: Error in AS-i slave 24B to 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.

❑

Dealing with Problems/Error Displays 5

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 1 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 1.8.3)

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 relevant 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 displays

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.

Table 5-1 Error displays, continued

Error	Possible Cause	Remedy
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.
	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.

Table 5-1 Error displays, continued

Error	Possible Cause	Remedy
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.
	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.

❑

AS-Interface Protocol Implementation Conformance Statement (PICS) A

PICS for DP/AS-Interface Link 20E

Table A-1

Vendor	SIEMENS AG
Product Name	DP/AS-Interface Link 20E
Order Number	6GK1 415−2AA10
Version	Hardware: 01 Software: V3.0
Master Profile	M4
Date	01.07.2008

List of master functions available

Symbols in column 3 (M4)

Symbol	Meaning
X	Function exists
−	Function does not exist

Table A-2 PICS

No.	Function or call on the host interface (symbolic representation)	M4	Implementation of the function by ... / Notes
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

Table A-2 PICS, (continued)

No.	Function or call on the host interface (symbolic representation)	M4	Implementation of the function by ... / Notes
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
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 with 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)	−	Optional command

Table A-2 PICS, (continued)

No.	Function or call on the host interface (symbolic representation)	M4	Implementation of the function by ... / Notes
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
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
25	Status = Read_AIDI(AImage)	X	see Section 3.3
26	Status = Write_AODI(AImage)	X	see Section 3.3
27	String, Status = Read_ParamStr(S_Addr)	X	see Section 3.3
28	Status = Write_ParamStr(S_Addr, String)	X	see Section 3.3
29	String, Status = Read_DiagStr(S_Addr)	X	see Section 3.3
30	String, Status = Read_IdentStr(S_Addr)	X	see Section 3.3
Part B	**Supported Slave Profiles**		
1	Support of extended address mode	X	
2	Support of combined transaction type 1 integrated (S-7.3 only)	X	
3	Full support of Combined transaction type 1 integrated	X	Only profiles 7.3/7.4 are supported.

Table A-2 PICS, (continued)

No.	Function or call on the host interface (symbolic representation)	M4	Implementation of the function by ... / Notes
4	Support of Combined transaction type 2 integrated	X	
5	Support of Combined transaction type 3 integrated	X	
6	Support of Combined transaction type 4 integrated	X	
7	Support of Combined transaction type 5 integrated	X	

How the AS-i cycle time depends on the number of connected slaves

The AS-i cycle time can be calculated using the following formula:

t_{cycl} = (1 + number of activated AS-i slaves) x 156 µs

Note:

If two AS-i slaves with extended addressing mode occupy the same address (for example, address 5A and address 5B), this slave pair is calculated as one AS-i slave in the above formula. The reason for this is that slave pairs with the same address are addressed only in every second cycle. The cycle time in the formula above is therefore doubled for such slaves.

❑

References

B

/1/ AS−Interface. Das Aktuator−Sensor−Interface für die Automation
AS−Interface. The Actuator−Sensor−Interface fo Automation

Werner Kriesel, O.W. Madelung, Carl Hanser Verlag München Wien 1999

/2/ AS-Interface Complete Specification

can be ordered from the AS−International Association e.V.
Address:

AS−International Association
Zum Taubengarten 52
D−63571 Gelnhausen
Germany

Tel.: +49 − 6051 − 473212
Fax.: +49 − 6051 − 473282

(The AS-i technology is promoted by the AS-Interface Association e. V.)

Internet address of the AS-International Association e.V.:

http://www.as-interface.net

/3/ SIMATIC NET
Industrial Communication for Automation and Drives
Catalog IK PI, Siemens AG

/4/ SIMATIC NET
PROFIBUS Networks
Manual, Siemens AG (ID: 1971286)

/5/ PROFIBUS standard EN 50170

Order Numbers

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

Many SIMATIC NET manuals are available on the Internet pages of Siemens Customer Support for Automation:

http://support.automation.siemens.com

Enter the ID of the relevant manual as a search key.

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Notes on the CE Mark

C

Product name:

DP/AS-Interface Link 20E Order no.: 6GK1 415-2AA10

EU Directive EMC 2004/108/EC

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
Industry Automation
Industrial Communication (I IA SC IC)
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 61000-6−4 : 2007	EN 61000-6−2 : 2005

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 EC Machinery Directive. There is therefore no declaration of conformity for this product relating to the EC Machinery Directive 98/37/EC.

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

DP/AS-Interface Link 20E
Release 08/2008
C79000-G8976-C235−01

Glossary

D

D.1 General

ESD guidelines

Standards for protecting electronic components from electrostatic phenomena − see IEC 61340–x–x (Electrostatics, several parts)
(ESD: Electrostatic Discharge)

D.2 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. (previously: SINEC S1)

AS-i A/B slave

AS-i A/B slaves use the extended addressing mode. Pairs of A/B slaves can be assigned to one address on the AS-Interface; by organizing addresses in this way, up to 62 AS-i A/B slaves can be attached to the AS-Interface.

AS-i analog slave

AS-i analog slaves are special AS-i 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 the “extended AS-i master”.

AS-i module

For the AS-Interface, a module concept has been defined that allows the block-like linking of AS-i slaves − sensors and actuators − via AS-i modules.
The following types of module exist:
The **active** AS-i module with an integrated AS-i chip; using this, up to four conventional sensors and actuators can be connected.
The **passive** AS-i module; this functions as a distributor and provides a connection for up to four sensors and actuators with an integrated AS-i chip.
In keeping with the concept of the standard AS-i master and the extended AS-i master, either AS-i chips with standard functions or with extended functions are used in the AS-i slaves.

AS-i slave

All the nodes that can be addressed by an AS-i master are known as AS-i slaves.
AS-i slaves are distinguished by their design (AS-i modules and sensors or actuators with an integrated AS-i attachment) and their address range (AS-i standard slaves and AS-i A/B slaves with the extended addressing mode).

AS-i standard slave

An AS-i standard slave always occupies one address on the AS-Interface; with this address organization, up to 31 AS-i standard slaves can be attached to the AS-Interface.

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).

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.

D.3 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.

Distributed peripheral I/O (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 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 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 slave

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

Firmware

Firmware; here, the software running on the device.

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).

Generic station description

Generic station descriptions (GSD) contain DP slave descriptions complying with EN 50170, Vol 2. The use of GSD files simplifies the configuration of the −> DP master and −> DP slaves.

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 fieldbus complying with EN 50170 Vol. 2. Previously known as 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. Now: 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. For each active station, the token rotates once between sending the token and receiving it.

UNFREEZE

Job for resetting the −> FREEZE mode.

UNSYNC

Job for resetting the −> SYNC mode.

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