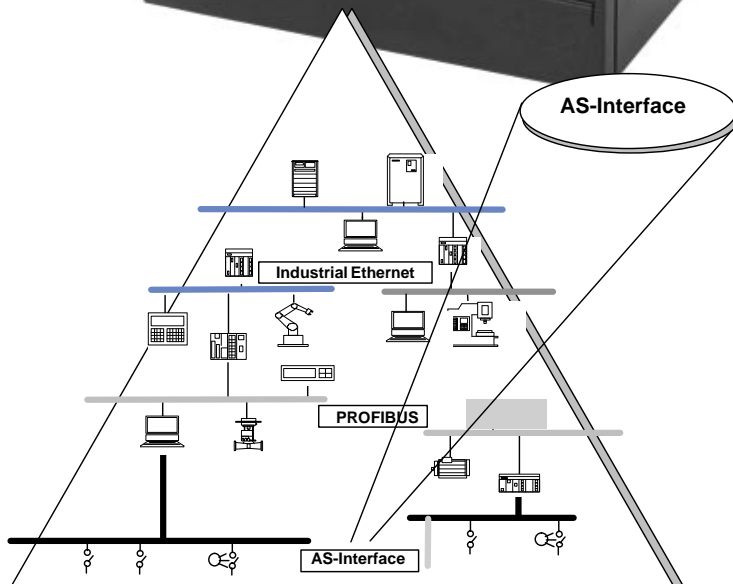


SIMATIC NET

DP/AS-Interface Link 20

Manual



C79000-G8976-C110

Release 01

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Safety Guidelines

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



Danger

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



Warning

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



Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken.

Note

draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

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

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.

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

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Preface

Purpose of the Manual

This manual supports you when using the **DP/AS-Interface Link 20** module. It contains information about how PROFIBUS DP masters can address AS-i actuators and AS-i sensors via this module.

We recommend the following procedure when...

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

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

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

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

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

- Read Chapter 2 in this manual.

Requirements

To understand this manual, you require the following:

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

Diskette with the Type /DDB file

The accompanying diskette contains the type and the DDB file that you require for configuring a DP/AS-Interface Link 20 module with your DP master (see Section 2.4).

Further Support – Who to Contact

If you have technical questions about using the product described here, please contact your local Siemens representative.

The addresses are listed:

- in our catalog IK 10
- on the Internet (<http://www.ad.siemens.de>)

Common Questions

Our customer support on the Internet provides useful information and answers to frequently asked questions (FAQ). Under FAQ, you will find information about our entire range of products.

The address of the AUT homepage in the World Wide Web of the Internet is as follows:

<http://www.ad.siemens.de/net>

Further Support – Hotline

- Our hotline is also available to deal with problems:
- Telephone: 0911 – 895 – 7000
(from abroad +49 – 911 – 895 – 7000)
- Telefax: 0911 – 895 – 7001
(from abroad +49 – 911 – 895 – 7001)
- E-Mail: simatic.support@nbgm.siemens.de
- Mailbox (BBS, analog/ISDN, 8N1):
0911 – 895 – 7100
(from abroad +49 – 911 – 895 – 7100)



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Technical Description and Installation Instructions

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1.1 General

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

You will learn the following:

- How to install the DP/AS-Interface Link 20 module
- The display and control elements of the DP/AS-Interface Link 20 module
- How to configure the DP/AS-Interface Link 20 module with the push button
- How to set the PROFIBUS address for the DP/AS-Interface Link 20 module.



Caution

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

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



Caution

Noise immunity / grounding

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



Caution

The AS-i power supply unit used must provide a low voltage, safely isolated from the network. This safe isolation can be implemented according to the following requirements:

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

Note

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

1.2 Application of the Module

DP Slave and AS-Interface Master

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

- The DP/AS-Interface Link 20 module connects the actuator-sensor interface with PROFIBUS DP.
- Using the DP/AS-Interface Link 20 module, you can access the inputs and outputs of the AS-i slaves from PROFIBUS DP.

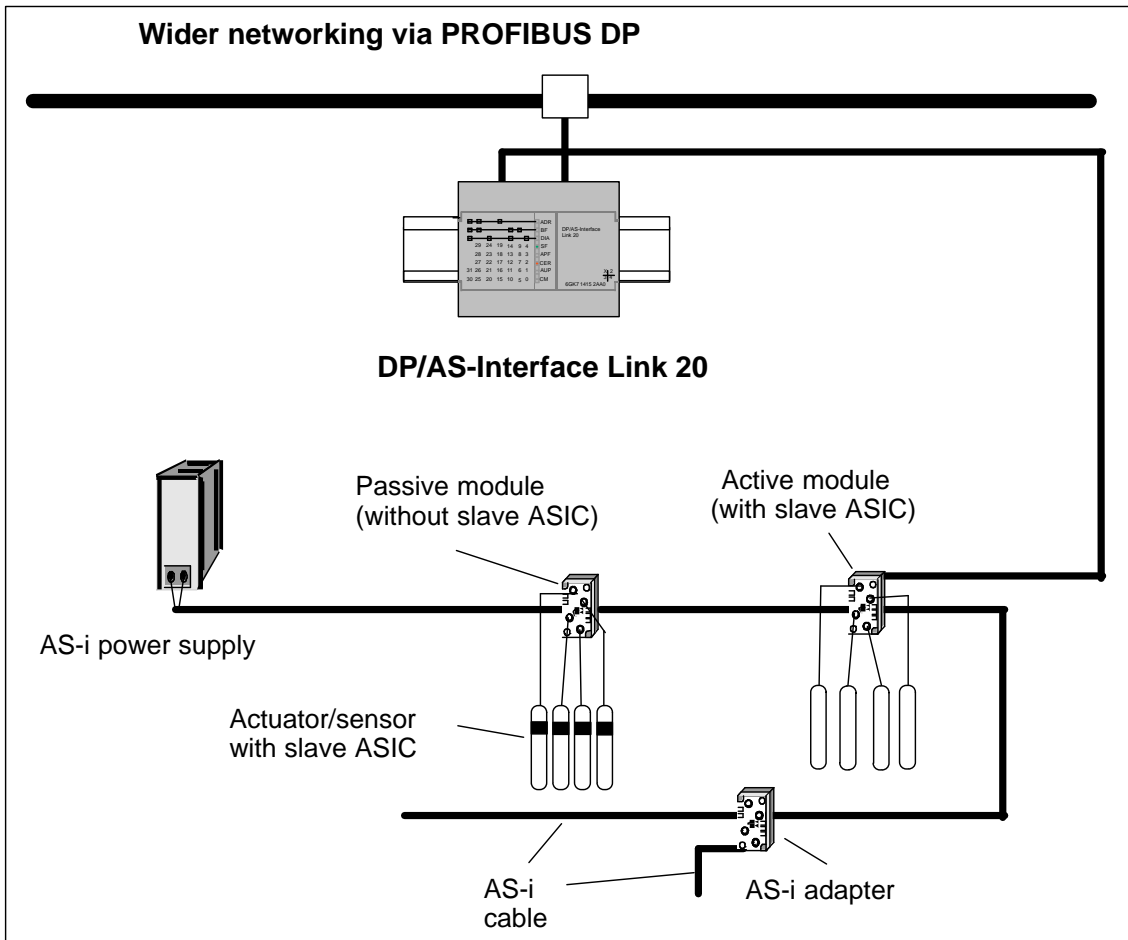


Figure 1-1 Example of a System Configuration with the DP/AS-Interface Link 20 Module

Components of the Product

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

- DP/AS-Interface Link 20 module
- Product information for the DP/AS-Interface Link 20 module

1.3 Technical Data of the Module

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

Table 1-1

Feature	Explanation/Values
AS-i cycle time	5 ms with 31 slaves
Configuration of the AS-Interface	By a button on the front panel
Supported AS-i master profiles	M2
Connection of the AS-i cable	Via a 7-pin terminal block Permitted current loading from pin 1 to pin 3 or pin 2 to pin 4, maximum 3 A
Connection to PROFIBUS	Via 9-pin sub D female connector
PROFIBUS address setting	– Address range 1 to 126 – Set with SET and DISPLAY buttons
Permitted loading 5V DC at PROFIBUS connector	max. 90 mA
Data rates supported (transmission rate) on PROFIBUS	9.6 Kbps; 19.2 Kbps; 45.45 Kbps; 93.75 Kbps; 187.5 Kbps; 500 Kbps; 1.5 Mbps; 3 Mbps; 6 Mbps; 12 Mbps
Power supply from the AS-i cable	According to the AS-i specification
Current consumption from the AS-i cable	max. 200 mA
Power consumption	3.7 W
Ambient conditions	
<ul style="list-style-type: none"> ● Operating temperature 	Horizontal installation: 0 to 60°C Vertical installation: 0 to 45°C
<ul style="list-style-type: none"> ● Transportation and storage temperature 	–40°C to +70°C
<ul style="list-style-type: none"> ● Relative humidity 	max. 95% at +25°C
Construction	
<ul style="list-style-type: none"> ● Type of protection 	IP 20
<ul style="list-style-type: none"> ● Dimensions (W x H x D) in mm 	90 x 80 x 62
<ul style="list-style-type: none"> ● Weight 	approx. 200 g

1.4 Installing the Module

Possibilities

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

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

Installation on a Standard Rail

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

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

Removing the Module from the Standard Rail

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

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

Convection

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

Vertical Installation

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

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

1.5 Front Panel – Access to all Functions

Connection, Display and Control Elements

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

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

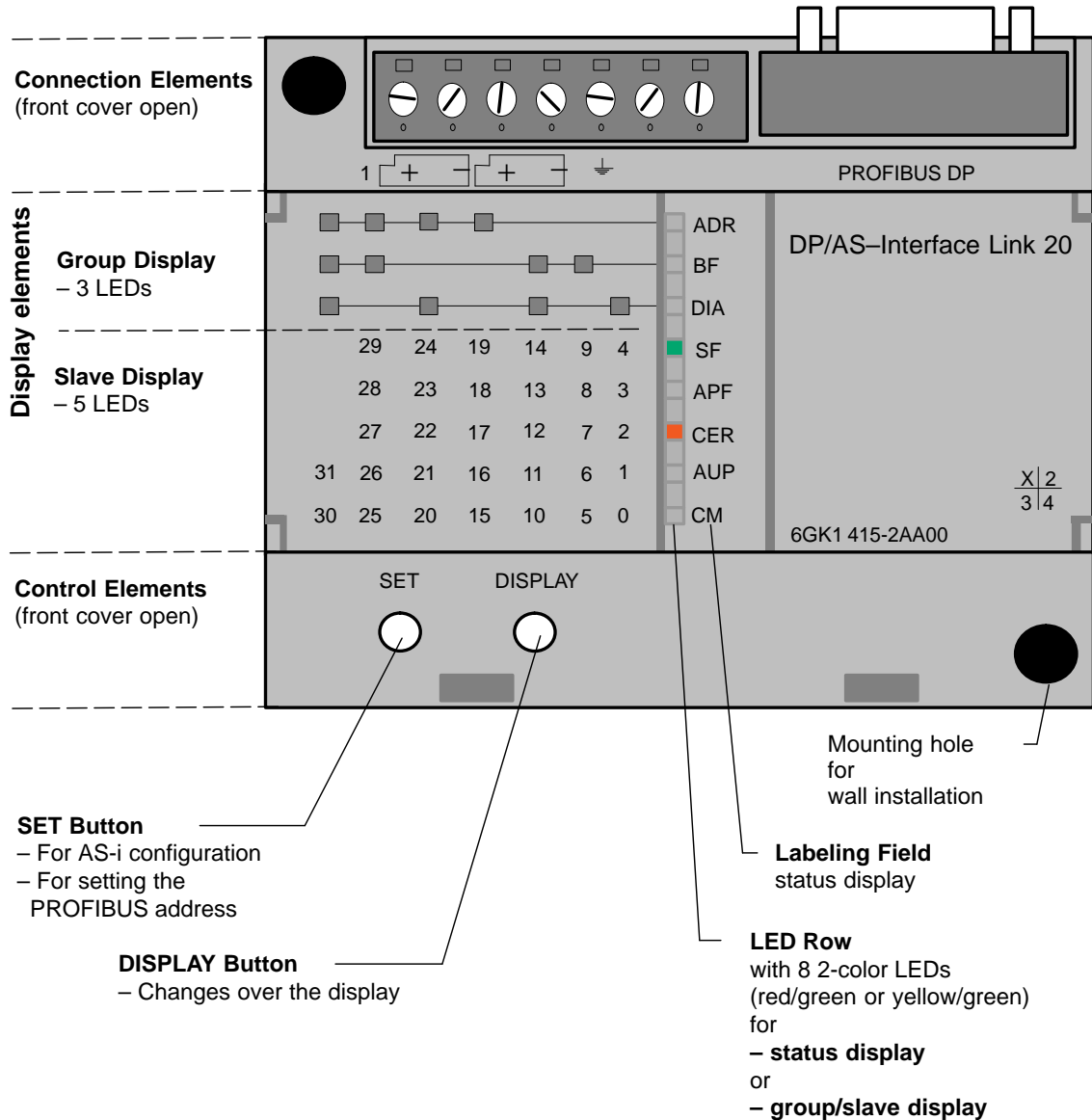


Figure 1-2 Front Panel

Connections, Operator Controls and Interpreting the Displays

For more detailed information, refer to the following sections.

1.6 Connection Elements

Connections

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

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

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

Connections to the AS-i cable

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

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



Caution

The permitted current loading of the AS-i connection contacts is 3 A. If this value is exceeded on the AS-i cable, the DP/AS-Interface Link 20 module must not be looped into the AS-i cable but must be connected with a tap line (only one pair of connectors of the DP/AS-Interface Link 20 module is used).

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

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

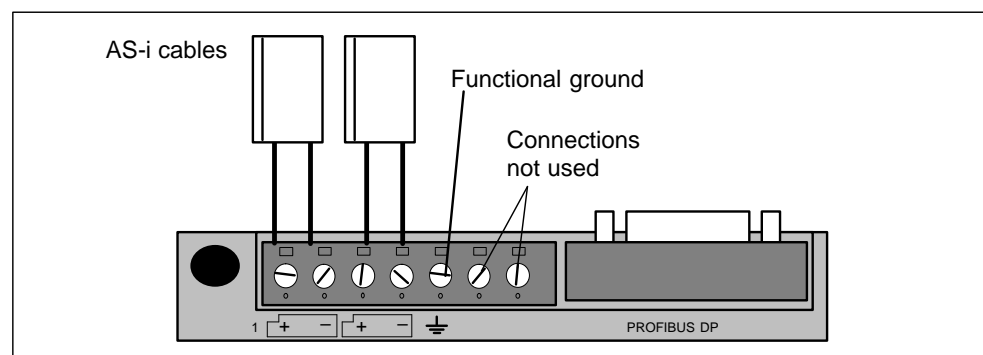


Figure 1-3 Connection of the AS-i Cable



Caution

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

Note

Functional Ground (terminal \perp)

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

Connection to PROFIBUS DP

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



Warning

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

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

1.7 Display and Control Elements

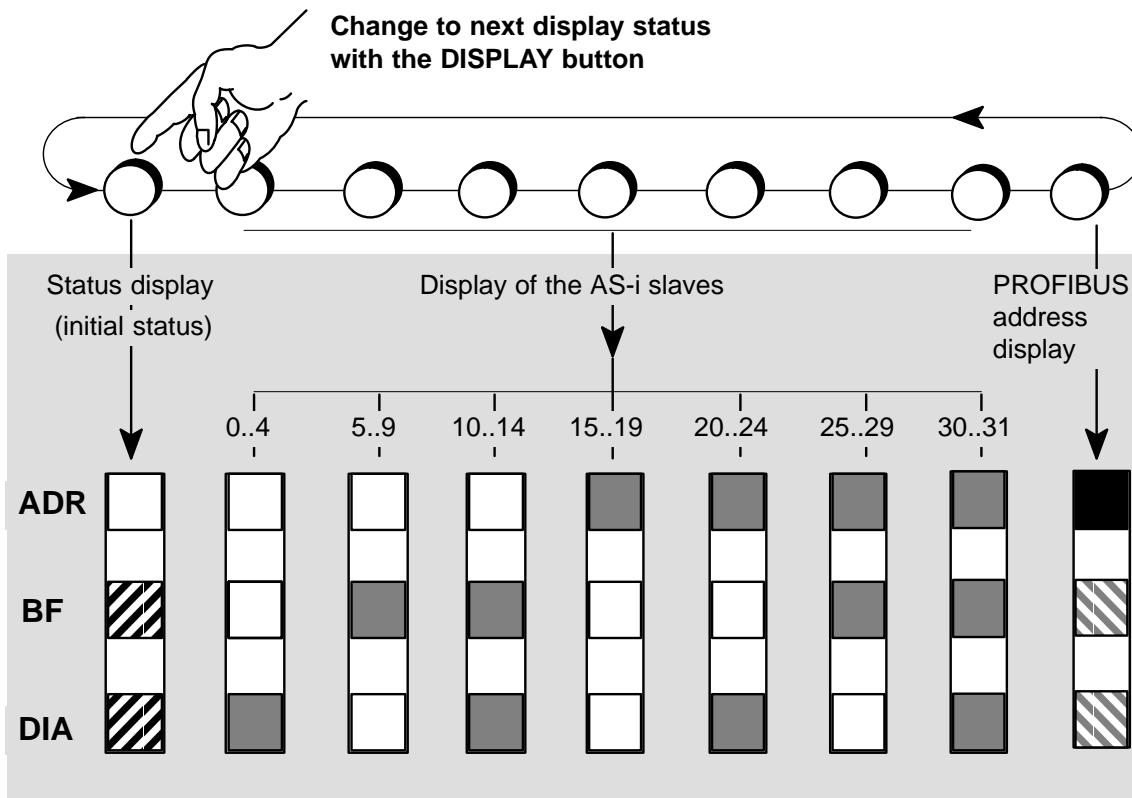
Meaning of the ADR, BF and DIA LEDs

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

Changing the Display Status – DISPLAY Button

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

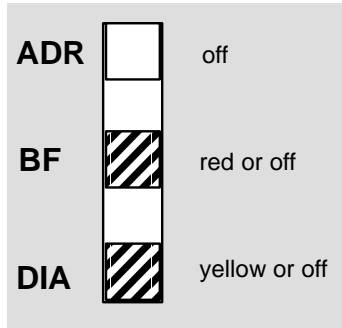
You can change between the status display, slave display and PROFIBUS display with the **DISPLAY** button. Each time you press the button, you change to the next display status finally returning to the initial status.



Key: red red/yellow or off green green or off off

1.7.1 Status Display

Interpreting the Status Display



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

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

The bottom 5 LEDs indicate errors/states on the AS-Interface. The BF and DIA LEDs indicate errors or diagnostic messages on PROFIBUS DP.

Meaning of the 7 Lower LEDs

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

Table 1-2

LED (color)	Status	Meaning
BF (red)	Bus Failure	Indicates errors on PROFIBUS DP. The LED is lit when: <ul style="list-style-type: none"> The connection between the DP master and the DP/AS-Interface Link 20 module has broken down or the DP master is not active. The DP/AS-Interface Link 20 module was not or was incorrectly configured/assigned parameters by the DP master.
DIA (yellow)	Diagnostics	The LED is lit when the DP/AS-Interface Link 20 module indicates diagnostic information to the DP master. A diagnostic message is generated by the DP/AS-Interface Link 20 module, for example, in the protected mode if there is a configuration error on the AS-Interface and when AS-i power fail occurs.
SF (red)	System error	The LED is lit when: <ul style="list-style-type: none"> The DP/AS-Interface Link 20 module has detected an internal error (for example EEPROM defective). While pressing the SET button, the DP/AS-Interface Link 20 module cannot currently make the required mode change (for example a slave exists with address 0).
APF (red)	AS-i Power Fail	This indicates that the voltage supplied to the AS-i cable by the AS-i power supply unit is too low or there is a complete power outage.

Table 1-2 , (continued)

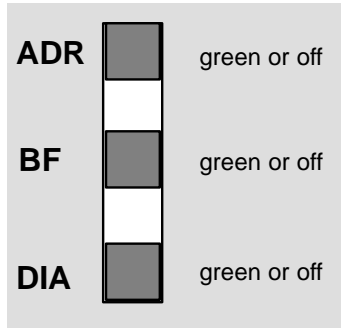
LED (color)	Status	Meaning
CER (yellow)	Configuration Error	<p>This LED indicates whether the slave configuration detected on the AS-i cable matches the expected configuration on the DP/AS-Interface Link 20 module. If they do not match, the CER LED is lit.</p> <p>The CER LED is lit in the following situations:</p> <ul style="list-style-type: none"> • When a configured AS-i slave does not exist on the AS-i cable (for example failure of the slave). • When an AS-i slave exists on the AS-i cable but it was not previously configured. • When an attached AS-i slave has different configuration data (I/O configuration, ID code) from the slave configured on the DP/AS-Interface Link 20 module. • When the DP/AS-Interface Link 20 module is in the offline phase.
AUP (green)	Autoprogramming available	<p>In the protected mode of the DP/AS-Interface Link 20 module, this indicates that automatic address programming of an AS-i slave is possible. The automatic address programming makes it much easier to exchange a defective AS-i slave on the AS-i cable (for more detailed information refer to Chapter 3.1).</p>
CM (yellow)	Configuration Mode	<p>This LED displays the mode of the DP/AS-Interface Link 20 module.</p> <ul style="list-style-type: none"> • LED lit: configuration mode • LED unlit: protected mode <p>The configuration mode is only required for installing and starting up the DP/AS-Interface Link 20 module. In the configuration mode, the DP/AS-Interface Link 20 module activates all connected AS-i slaves and exchanges data with them. For more information about the configuration mode, refer to Section 1.8.</p>

Note

If there is no error in the protected mode of the DP/AS-Interface Link 20 module, **all LEDs are off.**

1.7.2 Slave Display for AS-i Slaves

Interpreting the slave display status



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

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

Display Statuses and Operation in Detail

The AS-i slaves are displayed in groups of five. The upper three group LEDs indicate (in green) which of the groups of 5 is displayed. The lower five LEDs are lit green to indicate the detected or active AS-i slaves within the group.

- You can move from group to group by pressing the DISPLAY button again.
- The module returns to the status display in the following situations:
 - After displaying the last group (AS-i slaves 30, 31) and pressing the DISPLAY button twice. (In other words changing to the PROFIBUS address display and then to the status display.)
 - If you do not press the DISPLAY button for approximately 8 minutes.

Characteristics of the Slave Display

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

Example of a Slave Display

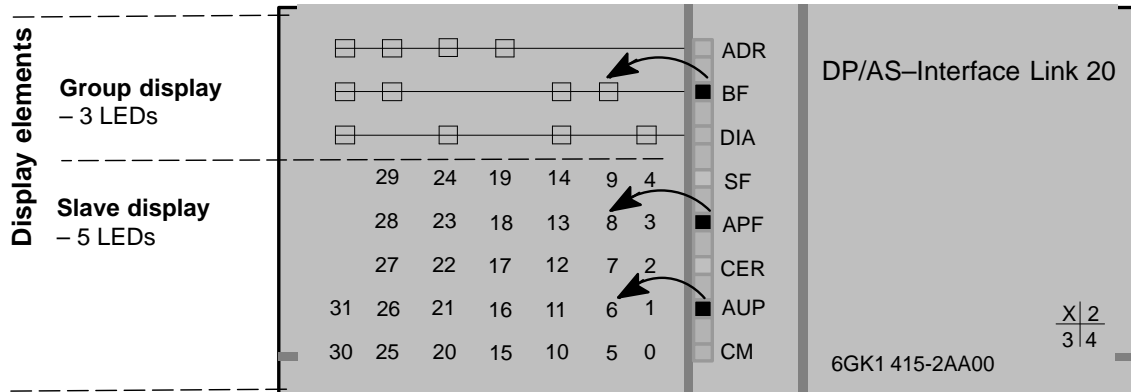


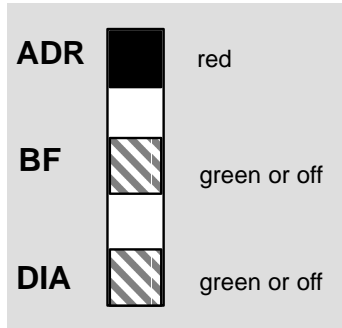
Figure 1-4 Example of a Slave Display

From the display you can obtain the following information:

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

1.7.3 Displaying and Setting the PROFIBUS Address

Interpreting the PROFIBUS Address Display



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

Setting the PROFIBUS Address

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

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

Note

The PROFIBUS address can only be set in this mode.

2. Change the display on the DP/AS-Interface Link 20 module until the "ADR" LED is lit red by pressing the DISPLAY button.

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

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

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

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

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

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

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

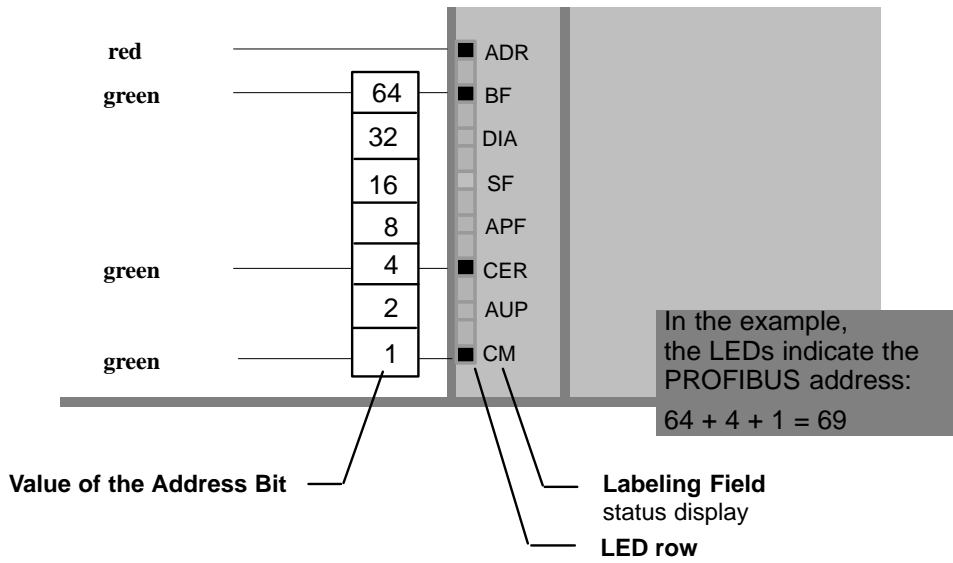


Figure 1-5

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

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

1.8 Configuring the AS-Interface with the SET Button

Interpreting the Display Status

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

- Configuration mode
- Protected mode

When supplied, the DP/AS-Interface Link 20 module is in the configuration mode as indicated by the “CM” LED being lit in the status display.

When you press the SET button, the mode is changed.

Note

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-Interface Link 20 module can exchange data with every AS-i slave connected to the AS-i cable (except for the AS-i slave with address '0'). Any AS-i slaves that are added later are detected immediately by the master and activated and included in the cyclic data exchange.

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

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

Protected Mode

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

Preparing to Configure

Make sure that the following situation applies:

- The data exchange between the DP master and DP/AS-Interface Link 20 module is interrupted or the DP master is in the STOP mode.
- The DP/AS-Interface Link 20 module and all AS-i slaves must be connected to the AS interface and supplied with power by the AS-i power supply unit.

Note

It is only possible to configure the AS interface with the status display and slave display status. The DP/AS-Interface Link 20 module must not be in the PROFIBUS address display mode, in other words when the SET button is pressed, the "ADR" LED display must not be lit red.

Configuring

1. Press the DISPLAY button to set the DP/AS-Interface Link 20 display to the "status display" mode (initial status).
2. Check whether the DP/AS-Interface Link 20 module is in the "configuration mode". ("CM" LED lit). If not, change the DP/AS-Interface Link 20 module to the configuration mode using the SET button.
3. By changing to the slave display with the DISPLAY button, you can check whether all the slaves connected to the AS-Interface exist.
4. Press the SET button. The DP/AS-Interface Link 20 module is then configured.

At the same time, the DP/AS-Interface Link 20 module is switched to the protected mode, the "CM" LED goes off.

The "CER" LED also goes off since the "expected configuration" stored on the DP/AS-Interface Link 20 module 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 is lit when the SET button is pressed.



Operation

2

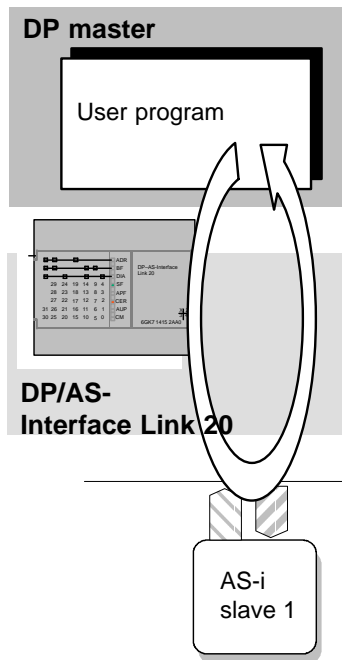
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2.1 About this Chapter

Purpose

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

User Program in the DP Master



Normally, you write a user program for the DP master. In the user program, you use the mechanisms described in this chapter.

These include the following:

- Access to the I/O Data on the AS Interface
- Checking the AS-Interface from the DP master using the functions of the command interface.

for example to

- Control the AS-i master (configuration mode, protected mode)
- Transfer parameters to the AS-i slaves
- Determine the actual configuration of the AS Interface
- Set or modify AS-i slave addresses
- Diagnostics of the DP slave and the AS-i slaves

Other Requirements for Operation

This chapter also contains information you require to operate the DP/AS-Interface Link 20 module and covers the following topics:

- DP configuration in the DP master, including the following:
 - The use of the type or DDB file
 - The entries to be made in the configuration tool of the DP master
- The possible transmission rates on PROFIBUS
- The use of the DP control commands (FREEZE, UNFREEZE, SYNC, UNSYNC, CLEAR)

2.2 How the PROFIBUS DP Master Addresses AS-i Slaves

Addressing the DP/AS-Interface Link 20 Module

The DP master accesses the inputs and outputs of the AS-i slaves via the DP/AS-Interface Link 20 module. The inputs and outputs of the AS-i slaves are mapped in a continuous data area in the DP master.

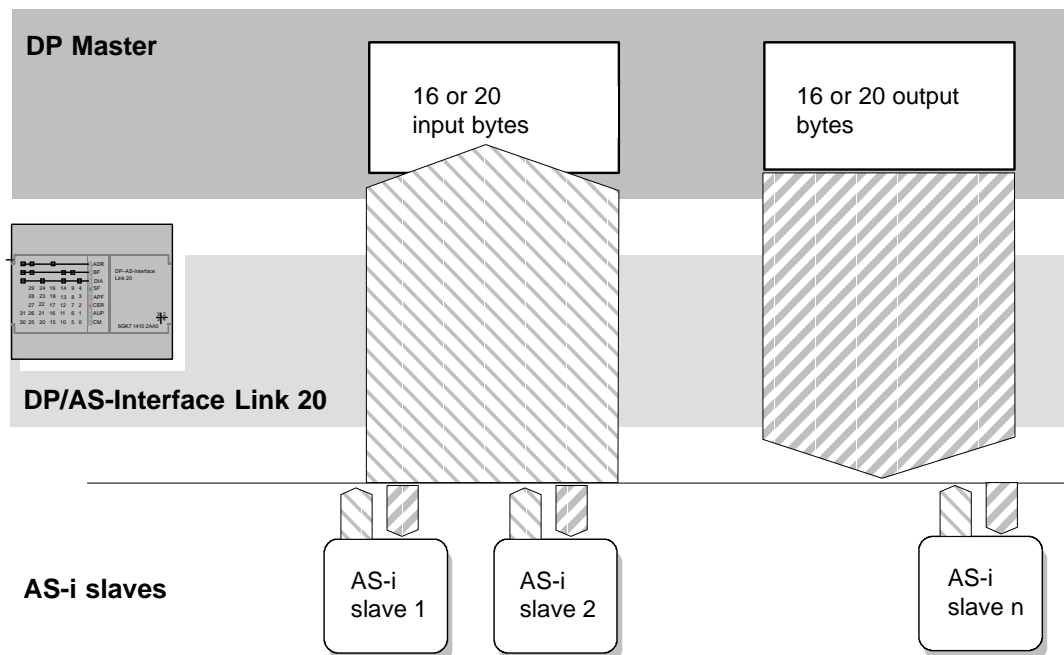


Figure 2-1

Interface to the DP Master

From the point of view of the PROFIBUS DP master, the DP/AS-Interface Link 20 module occupies either

- 16 input bytes and 16 output bytes or
- 20 input bytes and 20 output bytes (16 bytes I/O + 4 bytes command)

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

For more detailed information, refer to /3/ and the manuals for your PROFIBUS DP master.

Interface to the AS-i Slaves

The DP/AS-Interface Link 20 module 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.

Assignment of the Data Areas on the DP Master – Optional Command Interface

In total, the maximum of 31 AS-i slaves occupy 16 bytes of input data and 16 bytes of output data (see table below).

The start addresses m and n of the input or output data depend on the configuration of the PROFIBUS DP master.

During the DP configuration of the DP/AS-Interface Link 20 module using the configuration tool of the DP master, it is possible to specify the size of the input and output data areas as 16 or 20 bytes. At a length of 16 bytes, the DP master has access to the input and output data of the AS-i slaves. At a length of 20 bytes, an additional command interface is available via which the DP master can send commands to the DP/AS-Interface Link 20 module.

Assignment of the Input Data of the DP Master

Byte Number	Bits 7-4	Bits 3-0
$m+0$	reserved	Slave 1 Bit 3 Bit 2 Bit 1 Bit 0
$m+1$	Slave 2	Slave 3
$m+2$	Slave 4	Slave 5
$m+3$	Slave 6	Slave 7
$m+4$	Slave 8	Slave 9
$m+5$	Slave 10	Slave 11
$m+6$	Slave 12	Slave 13
$m+7$	Slave 14	Slave 15
$m+8$	Slave 16	Slave 17
$m+9$	Slave 18	Slave 19
$m+10$	Slave 20	Slave 21
$m+11$	Slave 22	Slave 23
$m+12$	Slave 24	Slave 25
$m+13$	Slave 26	Slave 27
$m+14$	Slave 28	Slave 29
$m+15$	Slave 30 Bit 3 Bit 2 Bit 1 Bit 0	Slave 31 Bit 3 Bit 2 Bit 1 Bit 0

m = the start address of the input data on the DP master

	Response buffer of the optional command interface (see Section 2.3)
$n+0$	
$n+1$	
$n+2$	
$n+3$	

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

Meaning

Using these commands, AS-i slaves can, for example, be readdressed or have parameters assigned.

Assignment of the Output Data of the DP Master

Byte Number	Bit 7-4	Bit 3-0
n+0	reserved	Slave 1 Bit 3 Bit 2 Bit 1 Bit 0
p+1	Slave 2	Slave 3
p+2	Slave 4	Slave 5
p+3	Slave 6	Slave 7
p+4	Slave 8	Slave 9
p+5	Slave 10	Slave 11
p+6	Slave 12	Slave 13
p+7	Slave 14	Slave 15
p+8	Slave 16	Slave 17
p+9	Slave 18	Slave 19
p+10	Slave 20	Slave 21
p+11	Slave 22	Slave 23
p+12	Slave 24	Slave 25
p+13	Slave 26	Slave 27
p+14	Slave 28	Slave 29
p+15	Slave 30 Bit 3 Bit 2 Bit 1 Bit 0	Slave 31 Bit 3 Bit 2 Bit 1 Bit 0

p = start address of the output data on the DP master

	Command buffer of the optional command interface (see Section 2.3)
q+0	
q+1	
q+2	
q+3	

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

Example

Figure 2-2 shows an example of the PROFIBUS DP master addressing 4 AS-i slaves. On the DP master, the start address $m = 0$ is used for the input data and $q = 0$ for the output data.

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

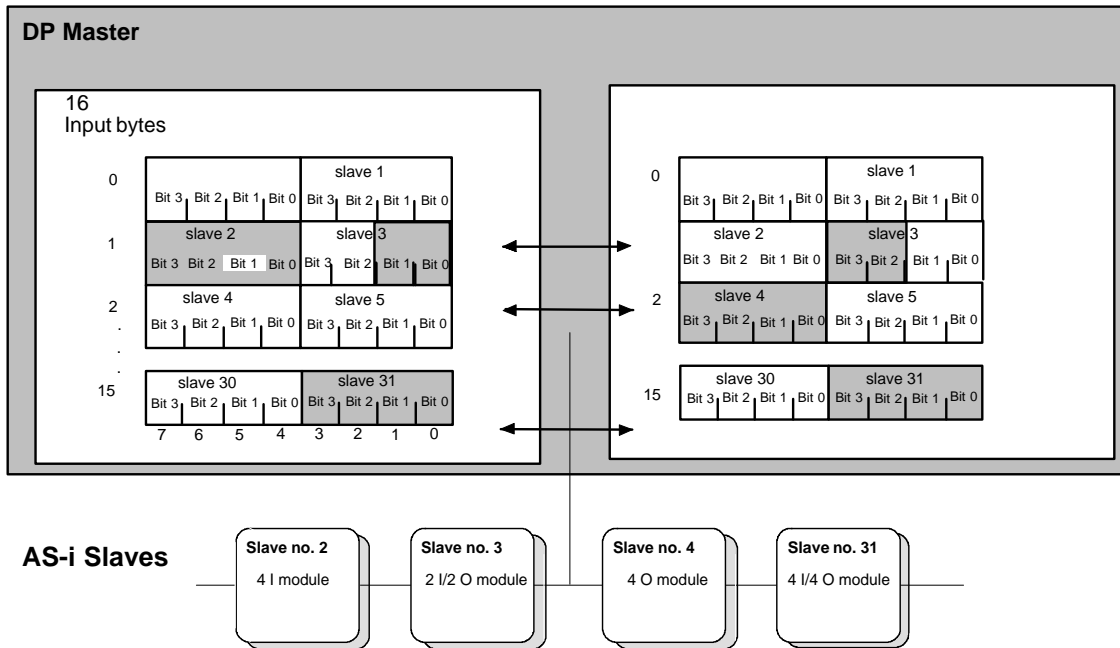
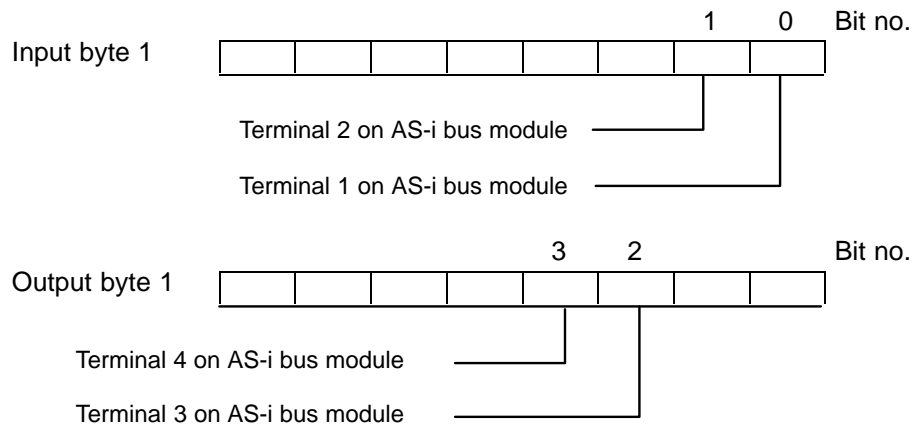


Figure 2-2

In the figure above, 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 bus modules to the data bits of the input/output bytes is shown below based on the example of slave number 3:



2.3 Command Interface of the DP/AS-Interface Link 20 Module

Overview

The DP master can send 20 jobs to the DP/AS-Interface Link 20 module via the command interface.

The following commands are available:

Table 2-1

Command	Parameter	Return	Coding
Write_parameter (see Section 2.3.1)	Slave address, parameter	Parameter echo (optional)	02H
Store_actual_configuration (see Section 2.3.2)	none		07H
Read_actual_configuration (see Section 2.3.3)	Slave address	Actual configuration data	08H
Set_operation_mode (see Section 2.3.4)	Mode		0CH
Change_slave_address (see Section 2.3.5)	Address1...2		0DH

The commands are described in detail in the following sections.

Requirements and Functional Description

The command interface of the DP/AS-Interface Link 20 module must be active, in other words the input and output data area of the DP master must be configured with a length of 16+4 bytes.

The command received from the DP master is entered in the command buffer of the DP/AS-Interface Link 20 module and executed.

Structure of the Command Buffer

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

Byte	Meaning			
	Bit 7	Bit 4	Bit 3	Bit 0
q+0	Job byte			
q+1	Command number			
q+2	AS-i slave address			
q+3	irrelevant		Parameter	

q = start address of the command buffer on the DP master.

The job byte has the following assignment:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	0	COMMAND

The job is triggered on the DP/AS-Interface Link 20 module using the COMMAND bit.

Structure of the Response Buffer

The basic structure of the response buffer is shown below. Bytes that are only relevant for certain command types are shown on a gray background.

Byte	Meaning			
	Bit 7	Bit 4	Bit 3	Bit 0
n+0	Acknowledgment byte			
n+1	Echo of the command number			
n+2	Command status			
n+3	irrelevant		Parameter echo	

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

The acknowledgment byte is assigned as follows:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	0	0	RESPONSE

The DP/AS-Interface Link 20 module indicates completion of the job using the RESPONSE bit.

Command Sequence

The diagram below shows the following:

- How to execute commands on the DP master (user program)
- How the DP/AS-Interface Link 20 module reacts to a command.

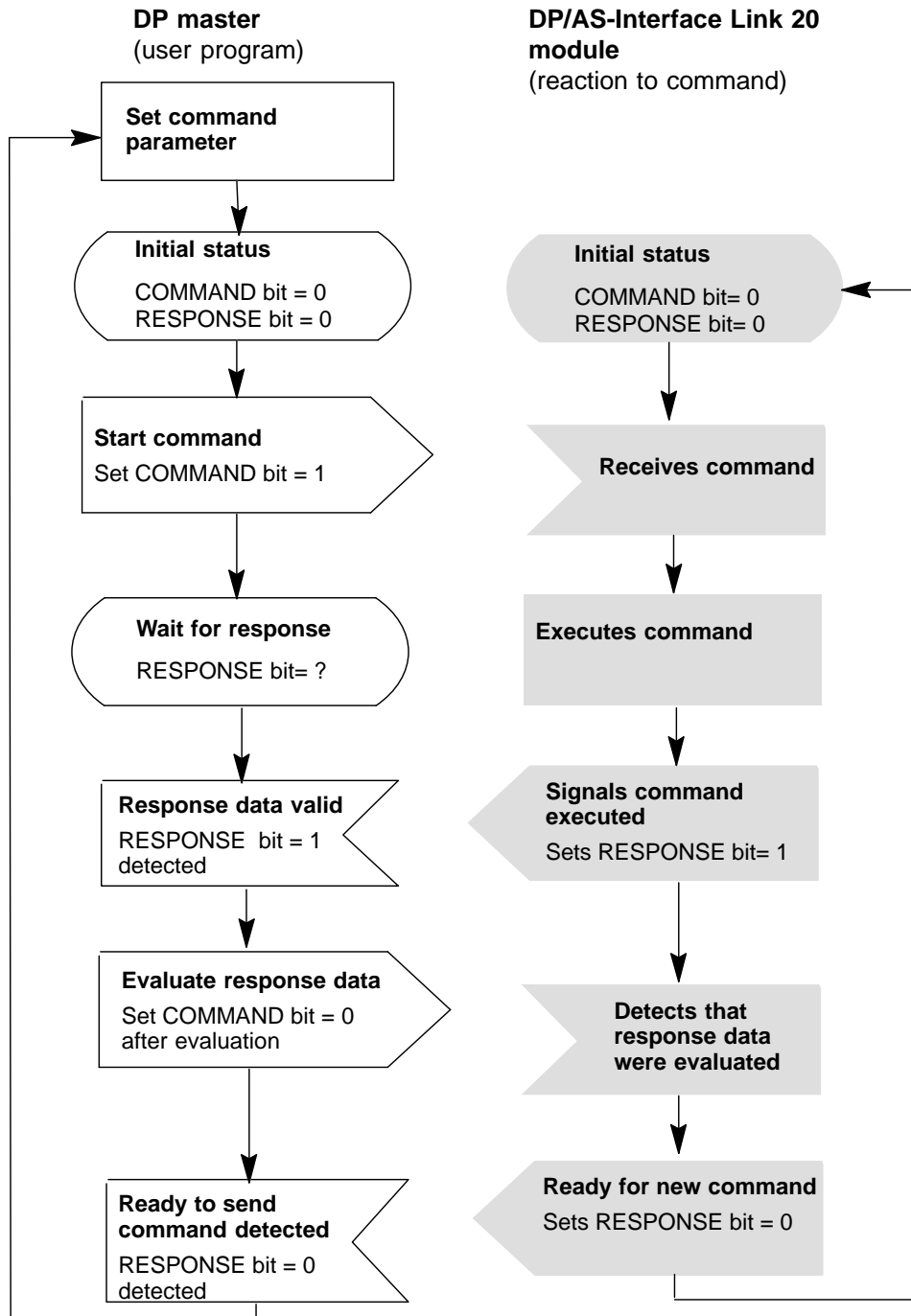


Figure 2-3

Note

If the DP/AS-Interface Link 20 module starts to execute a command, the command will be completed regardless of the state of the COMMAND bit.

Note

The RESPONSE bit is only reset when the COMMAND bit is set to "0" (by the DP master).

Command status

The command status of the response buffer indicates whether the job was processed correctly or whether errors occurred.

Table 2-2

Value	Meaning
00H	Job completed without error.
81 H	Slave address incorrect.
82 H	Slave not activated (not in LAS).
83 H	Error on AS-Interface.
84 H	Command not permitted (in DP/AS-Interface Link 20 module status).
85 H	AS-i slave 0 exists.
A1H	AS-i slave with the address to be modified was not found on the AS-Interface.
A2H	AS-i slave 0 exists.
A3H	An AS-i slave with the newly assigned address already exists on the AS-Interface.
A4H	The slave address cannot be deleted.
A5H	The slave address cannot be set.
A6H	The slave address cannot be stored.
F8H	Command number unknown.
F9H	EEPROM error

2.3.1 Write_Parameter

Meaning of the Command

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

The parameter is saved on the DP/AS-Interface Link 20 module in **volatile** memory. When DP communication is restarted (for example by turning the power to the DP master or DP/AS-Interface Link 20 off and then on) the parameters are set to the values configured on the DP_Master.

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

For additional information about the use of this job, refer to the detailed explanations in /1/ and /2/.

Structure of the Command Buffer

Byte	Meaning			
	Bit 7	Bit 4	Bit 3	Bit 0
q+0	Job byte			
q+1	Command number: 02H			
q+2	AS-i slave address			
q+3	irrelevant		Parameter	

q = start address of the command buffer on the DP master.

Structure of the Response Buffer

Byte	Meaning			
	Bit 7	Bit 4	Bit 3	Bit 0
n+0	Acknowledgment byte			
n+1	Echo of the command number: 02H			
n+2	Command status			
n+3	irrelevant		Parameter echo	

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

2.3.2 Store_Actual_Configuration

Meaning of the Command

With this call, the (actual) I/O configuration data detected on the AS-Interface and the (actual) ID codes of all AS-i slaves are stored permanently in the EEPROM of the DP/AS Interface Link 20 module 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 DP/AS-Interface Link 20 module changes to the offline phase and then returns to the normal mode (restart on the DP/AS-Interface Link 20).

This call is not made in the protected mode.

Structure of the Command Buffer

Byte	Meaning
q+0	Job byte
q+1	Command number: 07H

q = start address of the command buffer on the DP master.

Structure of the Response Buffer

Byte	Meaning
n+0	Acknowledgment byte
n+1	Echo of the command number: 07H
n+2	Command status

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

2.3.3 Read_Actual_Configuration

Meaning of the Command

With this call, the (actual) I/O configuration data and (actual) ID codes of an addressed AS-i slave detected on the AS-Interface are returned.

Structure of the Command Buffer

Byte	Meaning
q+0	Job byte
q+1	Command number: 08H
q+2	Slave address

q = start address of the command buffer on the DP master.

Structure of the Response Buffer

Byte	Meaning			
	Bit 7	Bit 4	Bit 3	Bit 0
n+0	Acknowledgment byte			
n+1	Echo of the command number: 08H			
n+2	Command status			
n+3	ID code		I/O configuration	

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

2.3.4 Set_Operation_Mode

Meaning 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 slave address "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 in **non-volatile** memory, in other words it is retained after a startup or restart.

When it changes from the configuration mode to the protected mode, the DP/AS Interface Link 20 module goes through a complete restart (change to the offline phase followed by change to the online mode).

Note

If an AS-i slave with address 0 is connected, the DP/AS-Interface Link 20 module cannot change from the configuration mode to the protected mode.

Structure of the Command Buffer

Byte	Meaning
q+0	Job byte
q+1	Command number: 0CH
q+2	Mode protected mode: 00H configuration mode: 01H

q = start address of the command buffer on the DP master.

Structure of the Response Buffer

Byte	Meaning			
	Bit 7	Bit 4	Bit 3	Bit 0
n+0	Acknowledgment byte			
n+1	Echo of the command number: 0CH			
n+2	Command status			
n+3	irrelevant		Parameter echo	

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

2.3.5 Change_Slave_Address

Meaning of the Command

With this call, the 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, there is an address change from "slave address old" = 0 to "slave address new".

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

1. An AS-i slave with "slave address old" exists.
2. If the old slave address is not 0, then an AS-i slave with address 0 cannot be connected at the same time.
3. The "slave address new" must have a valid value.
4. An AS-i slave with "slave address new" must not exist.

Note: When the 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 Command Buffer

Byte	Meaning			
	Bit 7	Bit 4	Bit 3	Bit 0
q+0	Job byte			
q+1	Command number: 0DH			
q+2	Slave address old			
q+3	Slave address new			

q = start address of the command buffer on the DP master.

Structure of the Response Buffer

Byte	Meaning			
	Bit 7	Bit 4	Bit 3	Bit 0
n+0	Acknowledgment byte			
n+1	Echo of the command number: 0DH			
n+2	Command status			

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

2.4 DP Configuration on the DP Master

Requirements: Importing the Type or DDB file

To be able to configure the DP/AS-Interface Link 20 module in the DP master, you must import the type or DDB file into the configuration tool of the DP master. Only then can the DP/AS-Interface Link 20 module be configured. Refer to the information in the manual of the appropriate configuration tool.

Note

The type file is included in the configuration tools Step 7, V. 4.1 and higher and COM PROFIBUS, V 3.2 and higher. With these versions, it is no longer necessary to import the type file.

Type File

The type file **SI804FAX.200** contains all the necessary information about the DP/AS-Interface Link 20 module required by the configuration tool (for example STEP 7 or COM PROFIBUS).

The type file is shipped on diskette along with this manual and can also be unloaded via a modem from the Interface Center (**SSC**) Fürth at the telephone number ++49/911/737972.

DDB File

The device database file **SIEM804F.GSD** also contains the information about the DP/AS-Interface Link 20 module required by the configuration tool (for example STEP 7 or COM PROFIBUS).

You require the DDB file only when your DP master cannot process type files.

The type file is shipped on diskette along with this manual and can also be unloaded via a modem from the Interface Center (**SSC**) Fürth at the telephone number ++49/911/737972.

The DDB file can also be downloaded from the Internet at <http://www.ad.siemens.de> (under customer support/simatic/downloads...).

BMP File (Bitmap)

To allow graphic representation of the DP/AS Interface Link 20 module, some configuration tools, for example STEP 7 V4 use bitmap files.

Parameter Assignment/Configuration Frame

If your DP master can process neither type nor DDB files, under some circumstances, you can enter the parameter assignment frame and configuration frame for the DP/AS-Interface Link 20 module when you configure the DP master. The structure of the parameter assignment and configuration frame for the DP/AS-Interface Link 20 module is explained in Appendix B.

Entries in the Configuration Tool of the DP Master

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

- **Configuration**

The following selections are available:

- a) "16/16 bytes I/O byte con."
- b) "16/16 bytes con. + 4/4 field con."

Select a), if you only want to transfer I/O data to the DP/AS-Interface Link 20 module.

Select b), if you also want to use the command interface.

- **Parameter Assignment**

In the parameter assignment, only the user-specific DP parameters are entered in the configuration tool of the DP master. Bytes 7 to 31 have default values. **These default values must not be modified.**

The remaining 16 bytes contain the configured parameters for the AS-i slaves. These are the parameters assigned to the AS-i slaves after the DP/AS-Interface Link 20 module is turned on. (see /1/ or /2/.)

The configured parameters have the default values F_H . Many AS-i slaves can work correctly simply with these default values. Read the description of your AS-i slaves to find out which parameters are required for correct operation of the slave.

Note

The DP/AS-Interface Link 20 module stores the configured parameters in non-volatile memory and assigns the configured parameters to the AS-i slaves as soon as the power supply is applied to the AS-Interface.

If the configured parameters are modified when you reconfigure the DP master, the DP/AS-Interface Link 20 module stores the new values permanently when it is assigned parameters by the DP master. Finally there is an offline/online change on the AS-Interface. During this, all AS-i slaves are reset and assigned new parameter values. An offline/online change with slave reset only takes place when the configured parameters have been changed.

2.5 Transmission Rate on PROFIBUS

The DP/AS-Interface Link 20 module, supports the following transmission rates on PROFIBUS DP:

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

2.6 PROFIBUS DP Control Commands

The DP/AS-Interface Link 20 module supports all the control commands contained in the PROFIBUS DP standard:

Table 2-3

Control command	Effect
FREEZE	The values of the input data of the AS-i slaves that the DP master receives from the DP/AS-Interface Link 20 module, are frozen by the DP/AS-Interface Link 20 module. The DP/AS-Interface Link 20 module updates this data once with each further FREEZE function.
UNFREEZE	The FREEZE command is canceled.
SYNC	The values of the DP output data transferred to the AS-i slaves by the DP/AS-Interface Link 20 module, are synchronized by the DP/AS-Interface Link 20 module. The DP/AS-Interface Link 20 module updates these data once with each further SYNC.
UNSYNC	The SYNC command is canceled.
CLEAR	The values of the DP output data transferred to the AS-i slaves by the DP/AS-Interface Link 20 module are set to '0' by the DP/AS-Interface Link 20 module.

2.7 Slave Diagnostics

DP Master Receives Error Information

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

In the protected mode, the DP/AS-Interface Link 20 module signals "Diagnostics" whenever the configuration on the AS-Interface is changed.

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 2.7.4.

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

When changing from the protected mode to the configuration mode, "leaving diagnostic state" is not generated.

Note

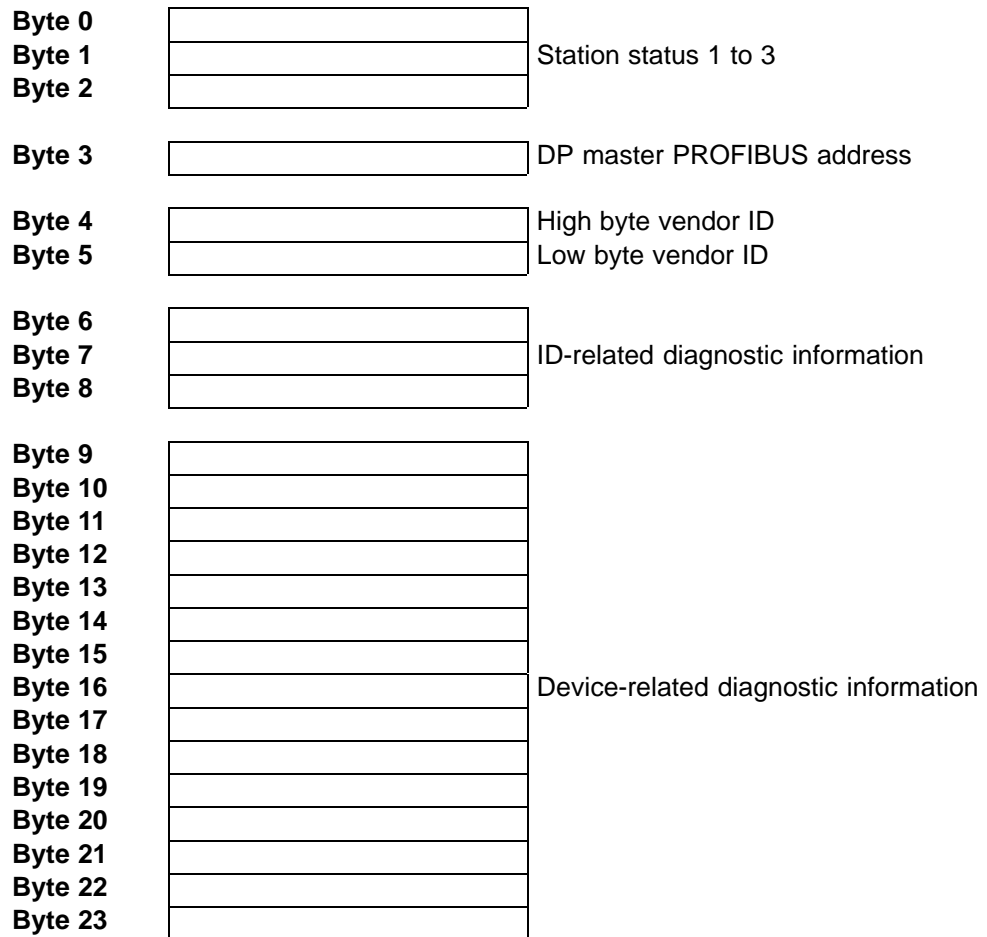
Note that the DP/AS-Interface Link 20 module only indicates errors on the AS-Interface when the DP/AS-Interface Link 20 module is operating in the protected mode. In the protected mode, the module indicates a problem when the voltage on the AS-Interface is too low (AS-i Power Fail) and when configuration errors are detected (missing, incorrect or existing but unconfigured AS-i slaves).

Note

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-Interface Link 20 module has failed and indicates this problem to its user program.

Structure of Slave Diagnostic Information

Slave diagnostic information on the DP/AS-Interface Link 20 module uses 23 bytes and is structured as follows:



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.

2.7.1 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: The DP/AS-Interface Link 20 module cannot be addressed by the DP master.	<ul style="list-style-type: none"> • Is the correct DP address set on the DP/AS-Interface Link 20 module? • Bus connector connected? • RS485 repeater set correctly? • External auxiliary voltage on the DP/AS-Interface Link 20 module exists?
	1	1: DP/AS-Interface Link 20 module not yet ready for data exchange.	Has the DP/AS-Interface Link 20 module already started up?
	2	1: Incorrect configuration data from the DP master. Required configuration is not supported by the DP/AS-Interface Link 20 module.	Check the configuration
	3	1: There are device-related errors in the AS-Interface diagnostic information. 0: No error was detected on the AS-Interface.	Evaluate the device-related diagnostic information (see Section 2.7.4).
	4	1: Function not supported, for example changing the DP address of the DP/AS-Interface Link 20 module by the DP master.	Check the configuration.
	5	1: The DP master cannot interpret the response from the DP/AS-Interface Link 20 module correctly.	Check the physical bus characteristics.
	6	1: The DP/AS-Interface Link 20 module detects an incorrect parameter assignment frame (e.g. incorrect length, incorrect ID number, incorrect parameters).	Check the configuration.
	7	1: The DP/AS-Interface Link 20 module was assigned parameters by a different DP master from the DP master that currently has access to the DP/AS-Interface Link 20 module.	This bit is always 1 if, e.g., you are currently accessing the DP/AS-Interface Link 20 module with a PG or a different DP master. The DP address of the parameter assignment master is in the diagnostic byte "Master PROFIBUS Address".

Station Status 2

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

Station Status 3

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

2.7.2 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-Interface Link 20 module.
4	80 H	Vendor ID of the DP/AS-Interface Link 20 module
5	4F H	In slave diagnostics, byte 4 and byte 5 also include the Vendor ID of the DP/AS-Interface Link 20 module.

2.7.3 Structure of ID-Related Diagnostics

ID-related diagnostics is not used by the DP/AS-i Link 20 module. 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	08H	Fixed value
8	00H	Fixed value

2.7.4 Structure of the Device-Related Diagnostic Information

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

Byte	Value	Meaning
9	0 F H	Header and length of the device-related diagnostic information.
10	01H	Fixed value
11	04H	Fixed value
12	00H	Fixed value

Bytes 13 to 23 of the device-related diagnostic information contain error bits for errors on the AS-Interface. A delta list 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	1 C H	Module class.

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

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

Byte	Value	Meaning
17	60 H	Fixed value
18	00H	Fixed value
19	20 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



Dealing with Problems/Error Displays

3

3.1	Replacing a Defective AS-i Slave/Automatic Address Programming	3-2
3.2	Error Displays / Remedying Errors	3-3

3.1 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.

Note

Remember that "automatic address programming" is only possible in the following situations:

- The DP/AS-Interface Link 20 module is in the protected mode and
 - Only one AS-i slave has failed.
-

The sections below explain how to replace failed AS-i slaves using the automatic address programming function.

Detecting a Defective AS-i Slave

If the AUP LED is lit (only in the protected mode) this indicates the following:

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

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

You can now replace the defective AS-i slave as follows:

- Replace the defective AS-i slave with an **identical** slave with address zero (default address).

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

The "AUP" display goes off. The LED in the slave display of the DP/AS-Interface Link 20 module indicates that the slave has been accepted.

3.2 Error Displays/Remedying Errors

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

Table 3-1

Error	Possible Cause	Remedy
BF LED lit (indicates an error on PROFIBUS)	Connection to the PROFIBUS master interrupted.	Check the attachment of the DP master and DP/AS-Interface Link 20 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-Interface Link 20 module.	Check/correct the configuration of the DP master.
DIA LED lit	The DP/AS-Interface Link 20 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.
APF LED 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.
	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.
	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-Interface Link 20 module is defective. Internal EEPROM error.	Replace the DP/AS-Interface Link 20 module.
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-Interface Link 20 module has not yet been configured.	Configure the DP/AS-Interface Link 20 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-Interface Link 20 module if the AS-i slave is not required.

Table 3-1 , (continued)

Error	Possible Cause	Remedy
	An unconfigured slave was connected to the AS-i cable.	Remove the AS-i slave or reconfigure the DP/AS-Interface Link 20 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-Interface Link 20 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-Interface Link 20 module and check the AS-i cable. Check that the shield of the AS-i power supply unit is connected correctly.
The DP/AS-Interface Link 20 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-Interface Link 20 module cannot switch to the protected mode as long as this slave exists.	Remove the AS-i slave with address 0.
The DP/AS-Interface Link 20 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 (for example by unplugging the bus connector) or switch the DP master to STOP.
	The SET button was not pressed long enough.	Press the SET button for at least 0.5 seconds.
After failure of an AS-i slave, the "AUP" display remains off.	The DP/AS-Interface Link 20 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 addressing unit.

Table 3-1 , (continued)

Error	Possible Cause	Remedy
	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-Interface Link 20 module has detected unconfigured AS-i slaves.	Remove the unconfigured 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-Interface Link 20 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)



PICS for the DP/AS-Interface Link 20 Module

Table A-1

Vendor	SIEMENS AG
Product Name	DP/AS-Interface Link 20
Order Number	6GK1415-2AA00
Version	1
Master Profile	M2
Date	31.12.1997

List of Master Functions Available

Table A-2

No.	Function or Call on the Host Interface (symbolic representation)	M2	Comment / Function implemented by / see Section
1	Image, Status = Read_IDI()	X	By access to the I/O data of the DP/AS-Interface Link 20 module by the DP master.
2	Status = Write_ODI(Image)	X	By access to the I/O data of the DP/AS-Interface Link 20 module by the DP master.
3	Status = Set_Permanent_Parameter(Addr, Param)	X	By PROFIBUS parameter assignment
4	Param, Status = Get_Permanent_Parameter(Addr)	–	not implemented
5	Status, GParam = Write_Parameter(Addr, Param)	X	see Section 2.3.1
6	Status, Param = Read_Parameter(Addr)	–	not implemented
7	Status = Store_Actual_Parameters()	–	not implemented
8	Status = Set_Permanent_Configuration(Addr, Config)	–	not implemented

Table A-2 , (continued)

No.	Function or Call on the Host Interface (symbolic representation)	M2	Comment / Function implemented by / see Section
9	Status, Config = Get_Permanent_Configuration(Addr)	–	not implemented
10	Status = Store_Actual_Configuration()	X	By pressing the SET button; also using a command (see Section 2.3.2)
11	Status, Config Read_Actual_Configuration(Addr) =	–	see Section 2.3.3
12	Status = Set_LPS(List31)	–	not implemented
13	Status, List31 = Get_LPS()	–	not implemented
14	Status, List31 = Get_LAS()	–	not implemented
15	Status, List32 = Get_LDS()	–	not implemented
16.0	Status = Get_Flags()	–	not implemented
16.1	Status, Flag = Get_Flag_Config_OK()	–	not implemented
16.2	Status, Flag = Get_Flag_LDS.0()	–	not implemented
16.3	Status, Flag Get_Flag_Auto_Address_Assign() =	–	not implemented
16.4	Status, Flag Get_Flag_Auto_Prog_Available() =	–	not implemented
16.5	Status, Flag Get_Flag_Configuration_Active() =	–	not implemented
16.6	Status, Flag Get_Flag_Normal_Operation_Active() =	–	not implemented
16.7	Status, Flag = Get_Flag_APF()	–	not implemented
16.8	Status, Flag = Get_Flag_Offline_Ready()	–	not implemented
17	Status = Set_Operation_Mode(Mode)	X	By pressing the SET button; also with a command (see Section 2.3.4)
18	Status = Set_Offline_Mode(Mode)	–	not implemented
19	Status = Activate_Data_Exchange(Mode)	–	not implemented
20	Status = Change_Slave_Address(Addr1, Addr2)	X	see Section 2.3.5
21	Status = Set_Auto_Address_Enable	–	not implemented
22	Status = Get_Auto_Address_Enable	–	not implemented
23.1	Status, Resp = Cmd_Reset_ASI_Slave(Addr, RESET)	–	not implemented
23.2	Status, Resp = Cmd_Read_IO_Configuration(Addr, CONF)	–	not implemented
23.3	Status, Resp = Cmd_Read_Identification_Code(Addr, IDCOD)	–	not implemented
23.4	Status, Resp = Cmd_Read_Status(Addr, STAT)	–	not implemented

Table A-2 , (continued)

No.	Function or Call on the Host Interface (symbolic representation)	M2	Comment / Function implemented by / see Section
23.5	Status, Resp = Cmd_Read_Reset_Status(Addr, STATRES)	–	not implemented

Symbols in column 3 (M2)

Symbol	Meaning
X	Function exists
–	Function does not exist

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

The following table shows how the AS-i cycle time depends on the number of connected slaves.

Number of slaves	1	2	3	4	5	6	7	8
Cycle time in μs	307	459	609	762	914	1066	1218	1369

Number of slaves	9	10	11	12	13	14	15	16
Cycle time in μs	1521	1673	1825	1977	2129	2280	2432	2584

Number of slaves	17	18	19	20	21	22	23	24
Cycle time in μs	2736	2888	3041	3193	3345	3497	3649	3802

Number of slaves	25	26	27	28	29	30	31
Cycle time in μs	3954	4105	4258	4410	4562	4714	4866

The specified times apply assuming that no frames are repeated, there are no management calls and all slaves are synchronized.



Structure of the PROFIBUS DP Parameter Assignment and Configuration Frame

B

When you require this information

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

Note

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

Configuration Frame

The structure of the configuration frame depends on whether you only require I/O operation with the AS-i slaves or whether you also require the command interface of the DP/AS-Interface Link 20 module:

I/O Operation

Number of output bytes DP master	Number of input bytes on the DP master	Configuration frame	Operation
16	16	3F	I/O operation

I/O Operation and Command

Number of output bytes DP master	Number of input bytes on the DP master	Configuration frame		Operation
16 + 4	16 + 4	Byte 0	Byte 1	I/O operation + Command
		3F	B3	

Default configuration (response to a Get_Cfg frame) is the configuration with I/O operation and command.

Structure of the Parameter Assignment Frame

The parameter assignment frame of the DP/AS-Interface Link 20 module is 32 bytes long. It consists of a 7 byte standard section complying with EN 50170 and a further 25 byte long field with additional parameters for the DP/AS-Interface Link 20 module.

Standard Section

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

User-specific parameters

Byte 7	XXH ¹⁾				
Byte 8	20H				fixed value
Byte 9	00H				fixed value
Byte 10	16H				fixed value
Byte 11	F5H				fixed value
Byte 12	04H				fixed value
Byte 13	A8H				fixed value
Byte 14	11H				fixed value
Byte 15	00H				fixed value
	Bit 7	Bit 4	Bit 3	Bit 4	
Byte 16	reserved		Parameter slave 1		
Byte 17	Parameter slave 2		Parameter slave 3		
Byte 18	Parameter slave 4		Parameter slave 5		
Byte 19	Parameter slave 6		Parameter slave 7		
Byte 20	Parameter slave 8		Parameter slave 9		
Byte 21	Parameter slave 10		Parameter slave 11		
Byte 22	Parameter slave 12		Parameter slave 13		
Byte 23	Parameter slave 14		Parameter slave 15		
Byte 24	Parameter slave 16		Parameter slave 17		
Byte 25	Parameter slave 18		Parameter slave 19		
Byte 26	Parameter slave 20		Parameter slave 21		
Byte 27	Parameter slave 22		Parameter slave 23		
Byte 28	Parameter slave 24		Parameter slave 25		
Byte 29	Parameter slave 26		Parameter slave 27		
Byte 30	Parameter slave 28		Parameter slave 29		
Byte 31	Parameter slave 30		Parameter slave 31		

1) Range of values for byte 7: bit 0 =1: Start bit monitoring on; bit 1=1: Stop bit monitoring on; bit 2=0: Watchdog base =10 ms; bit 2 =1: Watchdog base = 1 ms;

Note

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



References

/1/

AS-Interface Das Aktuator-Sensor-Interface für die Automation
Werner Kriesel, O.W. Madelung, Carl Hanser Verlag München Wien 1994

/2/

AS-Interface Complete Specification
can be ordered from the ASI Association e.V.

Address:

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

Tel.: +49 - 2174 - 40756

Fax.: +49 - 2174 - 41571

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

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

<http://www.as-interface.com>

/3/

SIMATIC NET Industrial Communications Networks

Catalog IK 10

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

/4/

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

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

/5/

SIMATIC NET
Industrial Communications Networks PROFIBUS Networks
Manual
Siemens AG

/6/

PROFIBUS standard EN 50170

/7/

SIMATIC
STEP 7-Micro/DOS
Manual
Siemens AG

/8/

SIMATIC
S7-200 Programmable Controller
System Manual
Siemens AG

Order numbers

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

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



Notes on the CE Label

Product name:

DP/AS-Interface Link 20

Order no.: 6GK1415-2AA00

EU Directive EMC 89/336/EEC



The product listed above meets the requirements of the EU directive 89/336/EEC "Electromagnetic Compatibility".

The EU conformity certificates are available for the relevant authorities according to the EU directive and are kept at the following address:

Siemens Aktiengesellschaft
 Bereich Automatisierungstechnik
 Industrielle Kommunikation (AUT93)
 Postfach 4848
 D-90327 Nuremberg
 Germany

Area of Application

The product meets the following requirements:

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

Installation instructions

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

- This manual

Information for manufacturers of machines

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

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

Glossary

AS-i

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.

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).

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/Os (DP)

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

DP 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.

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).

Device database

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

LAS

List of activated slaves.

LDS

List of detected slaves.

LPS

List of permanent 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.

PROFIBUS

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

PROFIBUS address

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

PROFIBUS DP

DP mode complying with EN 50170, Vol 2.

SIMATIC NET

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

SIMATIC NET PROFIBUS

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

SINEC

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

SYNC mode

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

Target rotation time

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

Token bus

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

UNFREEZE

Job for resetting the → FREEZE mode.

UNSYNC

Job for resetting the → SYNC mode.



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To
Siemens AG
A&D PT2

D-76181 Karlsruhe

From:

Your name: -----
Your title: -----
Your company: -----
Street: -----
City, country: -----
Phone: -----

Please check any industry that applies to you:

- | | |
|--|---|
| <input type="checkbox"/> Automotive | <input type="checkbox"/> Pharmaceutical |
| <input type="checkbox"/> Chemical | <input type="checkbox"/> Plastic |
| <input type="checkbox"/> Electrical Machinery | <input type="checkbox"/> Pulp and Paper |
| <input type="checkbox"/> Food | <input type="checkbox"/> Textiles |
| <input type="checkbox"/> Instrument and Control | <input type="checkbox"/> Transportation |
| <input type="checkbox"/> Nonelectrical Machinery | <input type="checkbox"/> Other ----- |
| <input type="checkbox"/> Petrochemical | |



