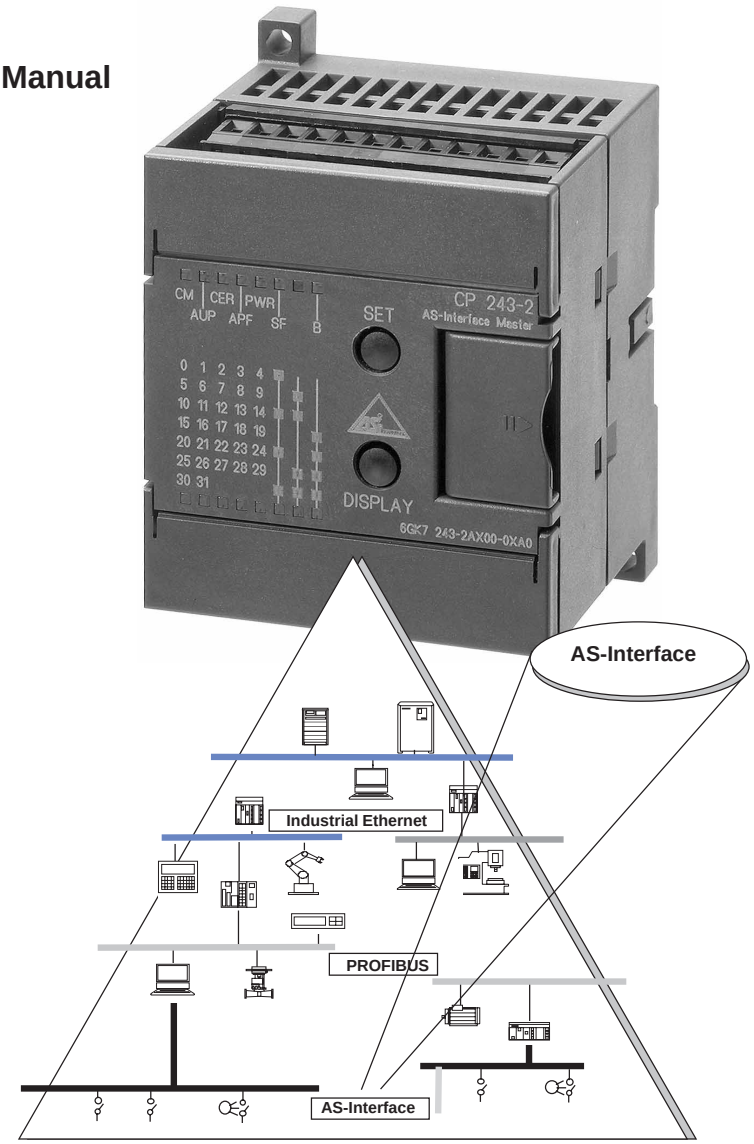
SIEMENS

SIMATIC NET

CP 243-2
AS-Interface Master

Manual



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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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Disclaimer of Liability

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

Preface

Purpose of the Manual

This manual supports you when using the **CP 243-2** module. It explains how to access AS-Interface actuators and AS-Interface sensors from an S7-22x CPU 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 CP 243-2 module in it:

– You will find the relevant information about connecting and operating the CP 243-2 in Chapter 3.

Requirements

To understand this document, you should be familiar with the manual ‘AS-Interface Introduction and Basic Information’ (part of this documentation package).

Diskette with Sample Programs

The diskette supplied with this manual (S7-200 PROGR) contains sample programs that will help you when programming the CP 243-2. These sample programs were written with STEP 7-Micro/WIN32 and can be run on an S7-22x CPU.

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Contents

Technical Description and Installation Instructions

1

This chapter outlines the basic functions of the CP 243-2 and explains how the module is installed and started up.

You will get to know the following properties of the CP 243-2:

- The applications
- The technical specifications
- Display and control elements
- Configuration

1.1 General Notes on Operation – Safety Warnings

Caution

When handling and installing the CP 243-2, make sure that you keep to the ESD guidelines.
The CP 243-2 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 CP 243-2, the CP 243-2 and the AS-i power supply unit must be correctly grounded.

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

1.2 Uses of the Module

DP Slave and AS-i Master

The CP 243-2 module can be operated in the S7-200 programmable controller. It allows the attachment of an S7-200 to the AS-Interface (as AS-i master). Both interfaces can be used independent of each other.

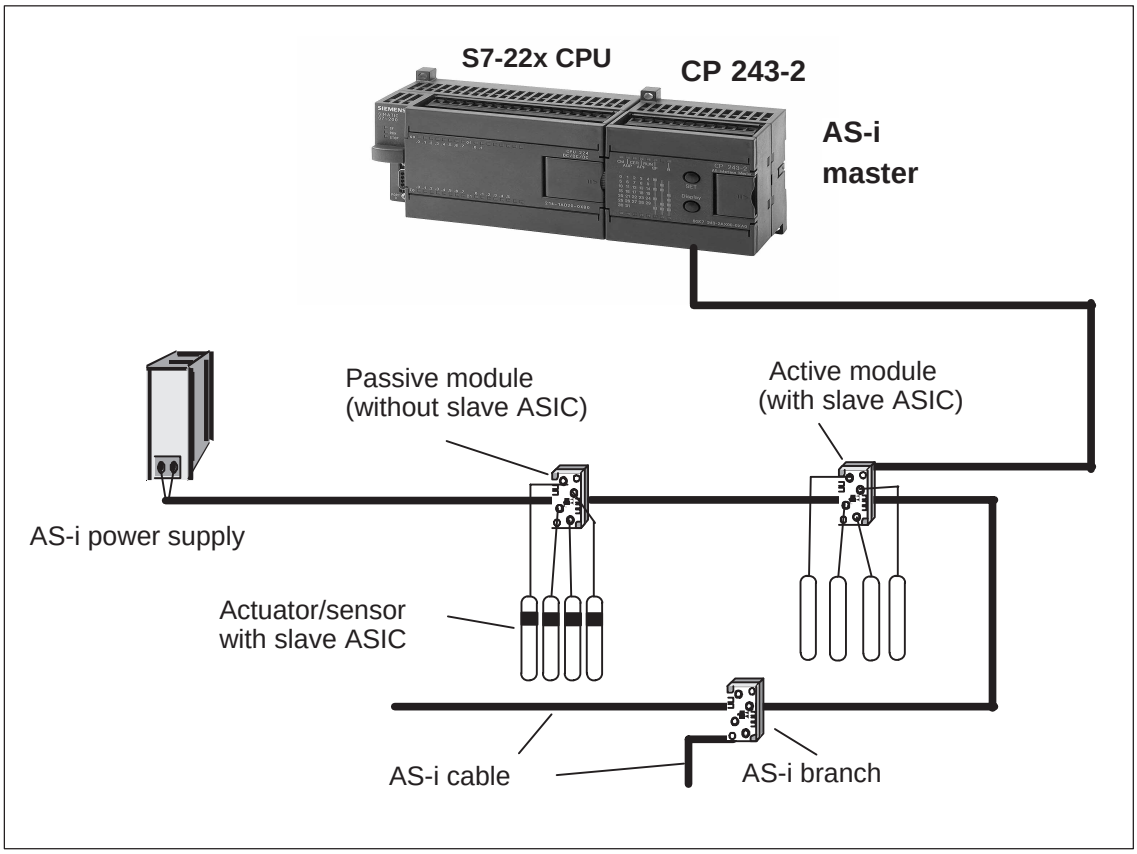

Figure 1-1 Example of a System Configuration with the CP 243-2

System Integration and Structure

The accompanying product information lists the CPUs with which the CP 243-2 can be operated.

From the point of view of the S7-22x CPU, the CP 243-2 represents two expansion modules (an 8DI/8DO digital module and an 8AI/8AO analog module).

The design of the CP 243-2 corresponds to that of a standard expansion module for an S7-200.

Components Supplied

The CP 243-2 product includes the following components:

- CP 243-2
- Product information bulletin on the CP 243-2

1.3 Technical Specifications of the Module

The technical specifications of the CP 243-2 module are as follows:

Table 1-1

Feature	Explanation/Values
AS-i cycle time	5 ms with 31 slaves 10 ms with 62 AS-i slaves using the extended addressing mode
Configuration of the AS-Interface	By a button on the front panel or using the total configuration command (refer to the description of the AS-i commands)
AS-i master profiles supported	M1e
Attachment to the AS-i cable	Via an S7-200 terminal block Permitted current loading from terminal 1 to 3 or from terminal 2 to 4 maximum 3 A
Address range	One digital module with 8DI/8DO and one analog module with 8AI/8AO
Power supply SIMATIC backplane bus	5 V DC
Current consumption from 5 V DC	max. 220 mA
Power supply from the AS-i cable	According to the AS-i specification
Current consumption from the AS-i cable	max. 100 mA
Power consumption	3.7 W
Ambient conditions	
• Operating temperature	Horizontal installation: 0 to°C Vertical installation: 0 to 45°C
• Transport and storage temperature	–40°C to +70°C
• Relative humidity	max. 95% at +25°C
Construction	
• Type of protection	IP 20
• Module format	S7-200 expansion module
• Dimensions (W x H x D) in mm	71 x 80 x 62
• Weight	approx. 250 g

1.4 Installing the Module

Slots in the S7-200

The CP 243-2 can be inserted in all slots for expansion modules in the S7-200 programmable controller (CPUs 22x).

Possible Restrictions

There may, however, be restrictions depending on the CPU or power supply unit being used in terms of the following:

- Expandability with several expansion modules,

  For further information, refer to /4/;

- Electrical restrictions

  The maximum current consumption from the S7 backplane bus must not be exceeded. Please use the calculation table in /4/.

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 CP 243-2.

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

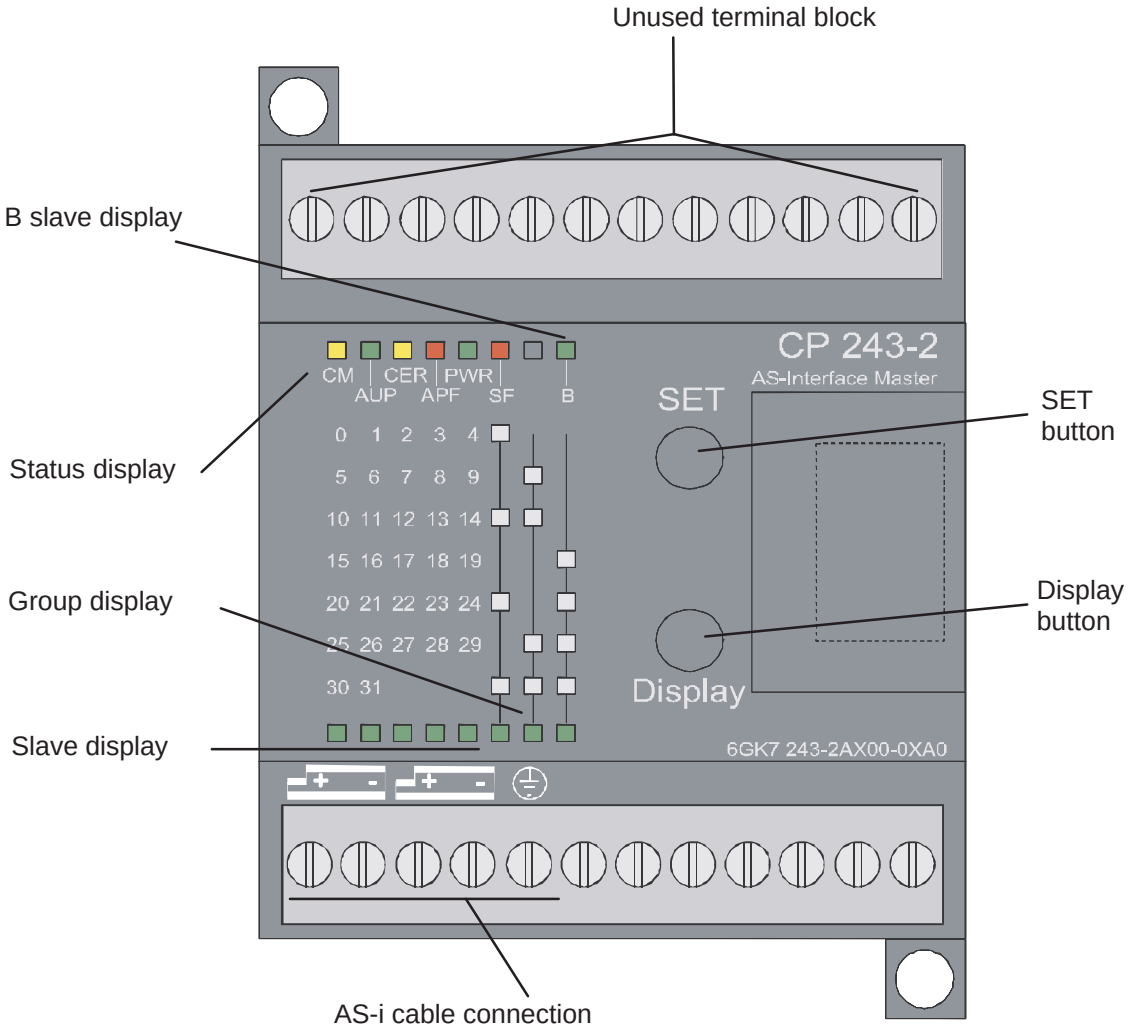

Figure 1-2

Connections, Operator Controls and Interpreting the Displays

For more detailed information, refer to the following sections.

1.6 Terminal Block

Connections

The CP 243-2 has the following connections:

- Two connections to the AS-i cable (bridged internally)
- One connection for functional ground

The terminals are located under the cover of the front panel of the CP 243-2.

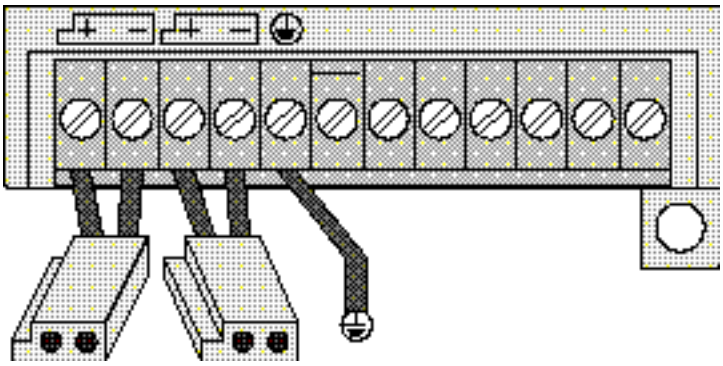

Figure 1-3 Connecting the AS-i Cable

Connections to the AS-i Cable

The CP 243-2 has two connections for AS-i cables that are jumpered internally on the CP 243-2.

This allows the CP 243-2 to be “looped” into the AS-i cable.

Caution

The load capacity of the AS-i contacts is a maximum of 3 A. If this value is exceed on the AS-i cable, the CP 243-2 must not be “looped into” the AS-i cable but must be connected by a separate cable (in this case only one pair of terminals of the CP 243-2 is used). The CP 243-2 must be connected to the grounding conductor via the ground terminal.

Note

Functional ground **(terminal ⏚)**

The CP 243-2 has a connection for functional ground. This connector should be connected to the PE conductor with as little resistance as possible.

1.7 Modes of the CP 243-2

Standard Operation

In this type of operation, the user program accesses the user data of the AS-i slaves and the diagnostic data of the CP 243-2. Programming is simple and this type of operation is adequate for the majority of automation tasks.

In standard operation, no commands or special parameters are transferred to the slaves. This type of operation corresponds to the profile M0 of the AS-i master specification.

Extended Operation

In extended operation, the user program uses the command interface of the CP 243-2.

This means that the entire range of functions in the AS-i system is available to the PLC programmer. In particular, the AS-i master calls (for example to assign parameters to slaves) are available. This type of operation corresponds to the profile M1e of the AS-i master specification.

1.8 Displays and Operator Controls

Changing the Display Status – DISPLAY Button

You can change between the status display (basic status), 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.

In the slave display, the slaves on the AS-Interface are displayed in groups of 5 slaves. You can move on the display to the next group with the DISPLAY button. First the standard or A slaves are displayed and then the B slaves (“B” LED is lit).

You return to the status display as follows:

- After you have displayed the last group (slave 30B, 31B) by pressing the DISPLAY button or
- If you do not press the DISPLAY button for a longer period of time (approximately 8 minutes).

Meaning of the LEDs

The front panel of the CP 243-2 has two rows of LEDs.

- The LEDs CM, AUP, CER, APF, PWR and SF in the upper row represent the status display.
  The B LED indicates B slaves. It is lit when the slave display is active if B slaves are displayed.
- The first five LEDs of the lower row indicate the connected slaves (slave display).
  The other three LEDs indicate the slave group.

The meaning of the LEDs depends on the status of the group displays.

If all the LEDs of the group display are off, the status display is active; in other words, the LEDs CM, AUP, CER, APF, PWR and SF indicate the status of the CP 243-2.

If at least one of the LEDs of the group display is lit, the status display goes off (exception: “PWR” LED remains lit) and the slave display is active.

SET Button

The SET button is required to configure the CP 243-2.

1.8.1 Status Display

Interpreting the Status Display

The status display is active when no group LEDs are lit.

The status display is the default display in the basic status of the CP 243-2.

Meaning of the LEDs

The LEDs have the following meaning:

Table 1-2

LED (color)	Status	Meaning
CM (yellow)	Configuration Mode	This displays the operating mode of the CP 243-2. • LED lit: Configuration mode • LED unlit: Protected mode The configuration mode is only required when putting the CP 243-2 into operation. In the configuration mode, the CP 243-2 activates all connected AS-i slaves and exchanges data with them. For more information about the configuration mode, refer to Section 1.9.
AUP (green)	Autoprog available	In the protected mode of the CP 243-2, 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 Section 6.1).
CER (yellow)	Configuration Error	This LED indicates whether the slave configuration detected on the AS-i cable matches the expected configuration (LPS). If they do not match, the CER LED is lit. The CER LED is lit in the following situations: • When a configured AS-i slave does not exist on the AS-i cable (for example failure of the slave). • When an AS-i slave exists on the AS-i cable but it was not previously configured. • When a connected AS-i slave has different configuration data (I/O configuration, ID code, extended ID1 code, extended ID2 code) from the AS-i slave configured on the CP 243-2. • When the CP 243-2 is in the offline phase.
APF (red)	AS-i Power Fail	This indicates that the voltage supplied by the AS-i power supply unit on the AS-i cable is too low or has failed.
PWR (green)	Power	The PWR LED (power) indicates that the CP 243-2 is supplied with power.

Table 1-2 , continued

LED (color)	Status	Meaning
SF (red)	System error	This LED is lit in the following situations: • The CP 243-2 has detected an internal problem (for example a defective EEPROM). • The CP 243-2 is unable to make the currently required mode change (for example an AS-i slave with address 0 exists) when a button is pressed.

1.8.2 Slave Display

Interpreting the Slave Display Status

You can switch over to the slave display mode used by pressing the DISPLAY button. You switch from group to group by pressing the DISPLAY button again: The slave display is active when at least one group LED is lit.

Characteristics of the Slave Display

- If the CP 243-2 is in the **configuration mode**, all **detected** AS-i slaves are displayed.
- If the CP 243-2 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.

Display Statuses in Detail

The AS-i slaves are displayed in groups of five. The three group LEDs indicate which group of 5 is being displayed in binary code. The 5 LEDs of the slave display then indicate the detected or active AS-i slaves within the group.

To find out which slaves are active, select the group of 5 (line) corresponding to the lit group LEDs. The currently lit LEDs of the slave display then indicate which slaves within this group are currently active.

If a group of B slaves is displayed, the “B” LED is also lit.

Example of a Slave Display

From the display shown below, you can obtain the following information:

- The 2nd group LED is lit, i.e. the 2nd line from the top (corresponds to 2^1 = 2_{DEC}; 2. group of 5; slaves 5–9).
- If the 2nd and 4th LEDs are also lit within the slave display, this means that slaves 6 and 8 are active.
- If the “B” LED is also lit, then in this example, this would mean that slaves 6B and 8B are active.

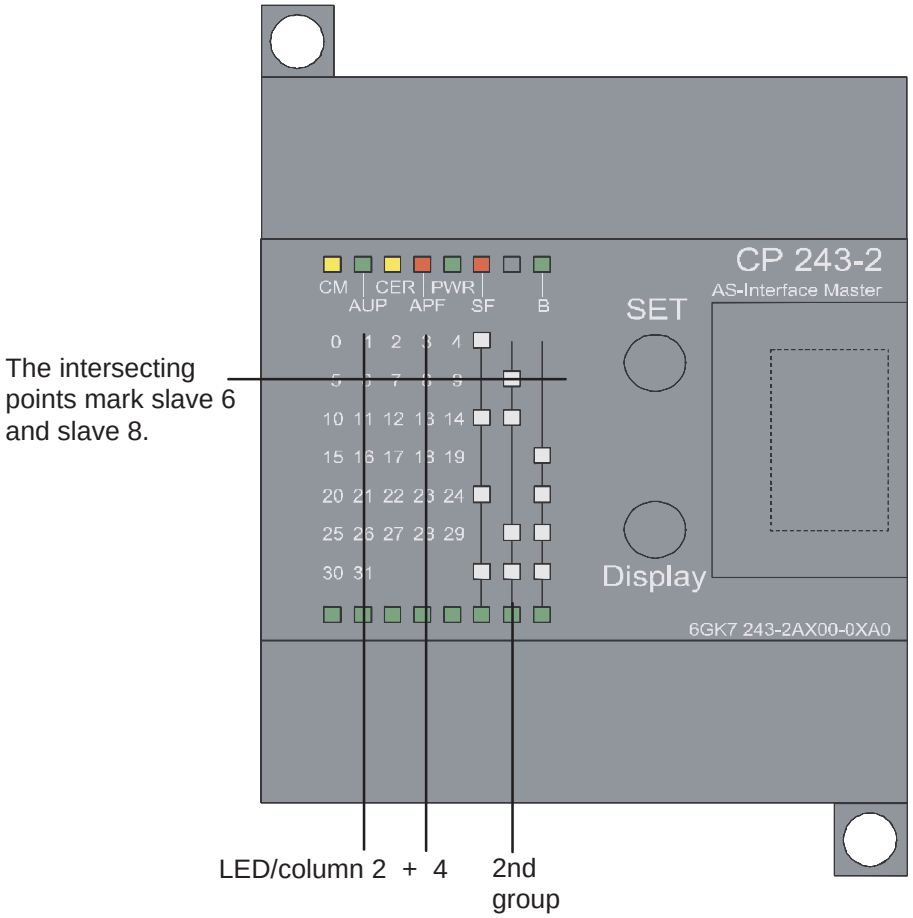

Figure 1-4 Example of a Slave Display

1.9 Configuring the AS-Interface with the SET Button

Interpreting the Display Status

The CP 243-2 distinguishes between two operating modes on the AS-Interface:

- Configuration mode
- Protected mode

Pressing the SET button changes the operating mode.

Note

The SET button is only effective when the bit PLC_RUN = 0 is set in the control byte of the CP 243-2. This is always the case when the S7-22x CPU is in the STOP mode.

Configuration Mode

The configuration mode is used to install and start up an AS-i installation.

If the CP 243-2 is in the configuration mode (CM LED lit), it can exchange data with every AS-i slave connected to the AS-i cable (except for an AS-i slave with address ’0’). Newly added AS-i slaves are detected immediately by the master, activated, and included in cyclic data exchange.

When installation and startup is completed, the CP 243-2 can be switched to the protected mode using the SET button. At the same time, active AS-i slaves are configured. The following data are then stored permanently on the CP 243-2:

- The addresses of the AS-i slaves
- The ID codes (ID code, extended ID1 code, extended ID2 code)
- The I/O configuration
- The current slave parameters

Protected Mode

In the protected mode, the CP 243-2 exchanges data only with the configured AS-i slaves. In this sense, “configured” means that the slave addresses and the configuration data stored on the CP 243-2 match the values of existing AS-i slaves.

Note

Changing from the configuration mode to the protected mode is only possible when there is no 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.

Preparing to Configure

Make sure that the following situation applies:

- The S7-22x CPU must be set to STOP (PLC_RUN=0).
- The CP 243-2 and all AS-i slaves must be connected to the AS-Interface and supplied with power by the AS-i power supply.

Configuring

1. Press the DISPLAY button to set the CP 243-2 display to the “status display” mode (initial status).
2. Check whether the CP 243-2 is in the “configuration mode”. (”CM” LED lit). If not, change the CP 243-2 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 CP 243-2 is configured.

   At the same time, the CP 243-2 is changed to the protected mode; the “CM” LED goes off.

   The “CER” LED also goes off since following configuration, the “expected configuration” stored on the CP 243-2 matches the “actual configuration” on the AS-Interface.

Note

Configuring the CP 243-2 during an AS-Interface Power Fail (for example when the AS-i power supply unit is turned off or when the CP 243-2 is not connected to the AS-Interface) resets the configuration of the CP 243-2. This has the following results:

- No AS-i slaves are configured;
- All AS-i slave parameters are set;
- Automatic address programming is activated (bit AUTO_ADDRESS_ENABLE = 1).

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Interface to the User Program in the S7-200 CPU

2

This chapter explains how the CP 243-2 is addressed. You will learn the significance of the data in the digital and in the analog module and you will learn how to access the analog inputs and outputs.

2.1 Overview

CP 243-2 as Expansion Module in the S7-200

The CP 243-2 occupies 2 consecutive expansion module slots in the S7-200:

- Digital module 8DI/8DO
- Analog module 8AI/8AO

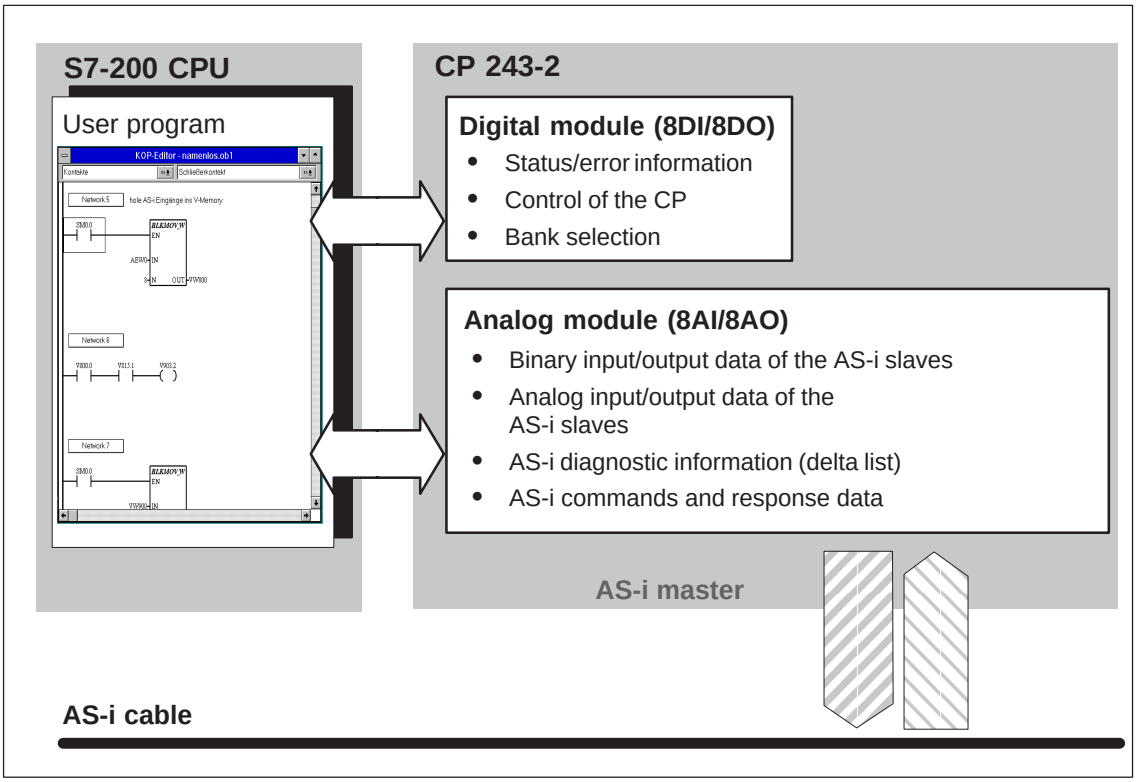


Figure 2-1

Digital Module

The digital module occupies 8 input and 8 output bits in the address area of the digital inputs and outputs. The S7-200 CPU and the CP 243-2 are coordinated via the digital module.

The data to be addressed in the analog module by the user program is selected using bank select bits.

Analog Module

The analog module occupies 16 input and 16 output bytes in the address area of the analog inputs and outputs. Data exchange with the AS-i slaves is handled via the analog module (see Figure 2-1).

The bank select mechanism means that a larger data area in total can be addressed in the analog module than the addressable data area in the S7-200 CPU for the expansion module.

2.2 Addressing the CP 243-2 in the S7-200 CPU

Address Areas

The start addresses of the address areas are determined by the following:

- The type of S7-200 CPU being used
- The slot of the CP 243-2 in the S7-200.

Examples

The following table contains examples of the addresses of the digital and analog input/output areas with the possible configurations with a CPU 212 and CPU 214.

- Example of a CPU 222 and a CP 243-2

CPU 222		CP 243-2			
8DI	**8 DO**	**8DI**	**8 DO**	**8AI**	**8AO**
I0.0	Q0.0	I1.0	Q1.0	AIW0	AQW0
I0.1	Q0.1	I1.1	Q1.1	AIW2	AQW2
I0.2	Q0.2	I1.2	Q1.2	AIW4	AQW4
I0.3	Q0.3	I1.3	Q1.3	AIW6	AQW6
I0.4	Q0.4	I1.4	Q1.4	AIW8	AQW8
I0.5	Q0.5	I1.5	Q1.5	AIW10	AQW10
I0.6	Q0.6	I1.6	Q1.6	AIW12	AQW12
I0.7	Q0.7	I1.7	Q1.7	AIW14	AQW14

- Example of a CPU 224 and a CP 243-2 Inserted Directly Beside the CPU

CPU 224		CP 243-2			
14 DI	**10 DO**	**8DI**	**8 DO**	**8AI**	**8AO**
I0.0	Q0.0	I2.0	Q2.0	AIW0	AQW0
I0.1	Q0.1	I2.1	Q2.1	AIW2	AQW2
I0.2	Q0.2	I2.2	Q2.2	AIW4	AQW4
I0.3	Q0.3	I2.3	Q2.3	AIW6	AQW6
I0.4	Q0.4	I2.4	Q2.4	AIW8	AQW8
I0.5	Q0.5	I2.5	Q2.5	AIW10	AQW10
I0.6	Q0.6	I2.6	Q2.6	AIW12	AQW12
I0.7	Q0.7	I2.7	Q2.7	AIW14	AQW14
I1.0	Q1.0				
I1.1	Q1.1				
I1.2					
I1.3					
I1.4					
I1.5					

- Example of a CPU 224, a CP 243-2 and a CP 243-2

CPU 224		CP 243-2				CP 243-2			
14 DI	**10 DO**	**8DI**	**8 DO**	**8AI**	**8AO**	**8DI**	**8 DO**	**8AI**	**8AO**
I0.0	Q0.0	I2.0	Q2.0	AIW0	AQW0	I3.0	Q3.0	AIW16	AQW16
I0.1	Q0.1	I2.1	Q2.1	AIW2	AQW2	I3.1	Q3.1	AIW18	AQW18
I0.2	Q0.2	I2.2	Q2.2	AIW4	AQW4	I3.2	Q3.2	AIW20	AQW20
I0.3	Q0.3	I2.3	Q2.3	AIW6	AQW6	I3.3	Q3.3	AIW22	AQW22
I0.4	Q0.4	I2.4	Q2.4	AIW8	AQW8	I3.4	Q3.4	AIW24	AQW24
I0.5	Q0.5	I2.5	Q2.5	AIW10	AQW10	I3.5	Q3.5	AIW26	AQW26
I0.6	Q0.6	I2.6	Q2.6	AIW12	AQW12	I3.6	Q3.6	AIW28	AQW28
I0.7	Q0.7	I2.7	Q2.7	AIW14	AQW14	I3.7	Q3.7	AIW30	AQW30
I1.0	Q1.0								
I1.1	Q1.1								
I1.2									
I1.3									
I1.4									
I1.5									

- Example of a CPU 224, an 8DI Module, a 3AI/1AO Module and a CP 243-2

CPU 224		**Module**	**Module**		**CP 243-2**			
14DI	**10 DO**	**8DI**	**3AI**	**1AO**	**8DI**	**8 DO**	**8AI**	**8AO**
I0.0	Q0.0	I2.0	AIW0	AQW0	I3.0	Q2.0	AIW8	AQW4
I0.1	Q0.1	I2.1	AIW2		I3.1	Q2.1	AIW10	AQW6
I0.2	Q0.2	I2.2	AIW4		I3.2	Q2.2	AIW12	AQW8
I0.3	Q0.3	I2.3			I3.3	Q2.3	AIW14	AQW10
I0.4	Q0.4	I2.4			I3.4	Q2.4	AIW16	AQW12
I0.5	Q0.5	I2.5			I3.5	Q2.5	AIW18	AQW14
I0.6	Q0.6	I2.6			I3.6	Q2.6	AIW20	AQW16
I0.7	Q0.7	I2.7			I3.7	Q2.7	AIW22	AQW18
I1.0	Q1.0							
I1.1	Q1.1							
I1.2								
I1.3								
I1.4								
I1.5								

2.3 Meaning of the Data in the Digital Module

Overview

The digital module of the CP 243-2 consists of four registers:

- Identification register, 8 bits (I/O module identifier)
- Error register, 8 bits
- Input register 8DI (status byte of the CP 243-2)
- Output register 8DO (control byte of the CP 243-2)

Essentially, the functions shown in the following diagram are handled via these registers:

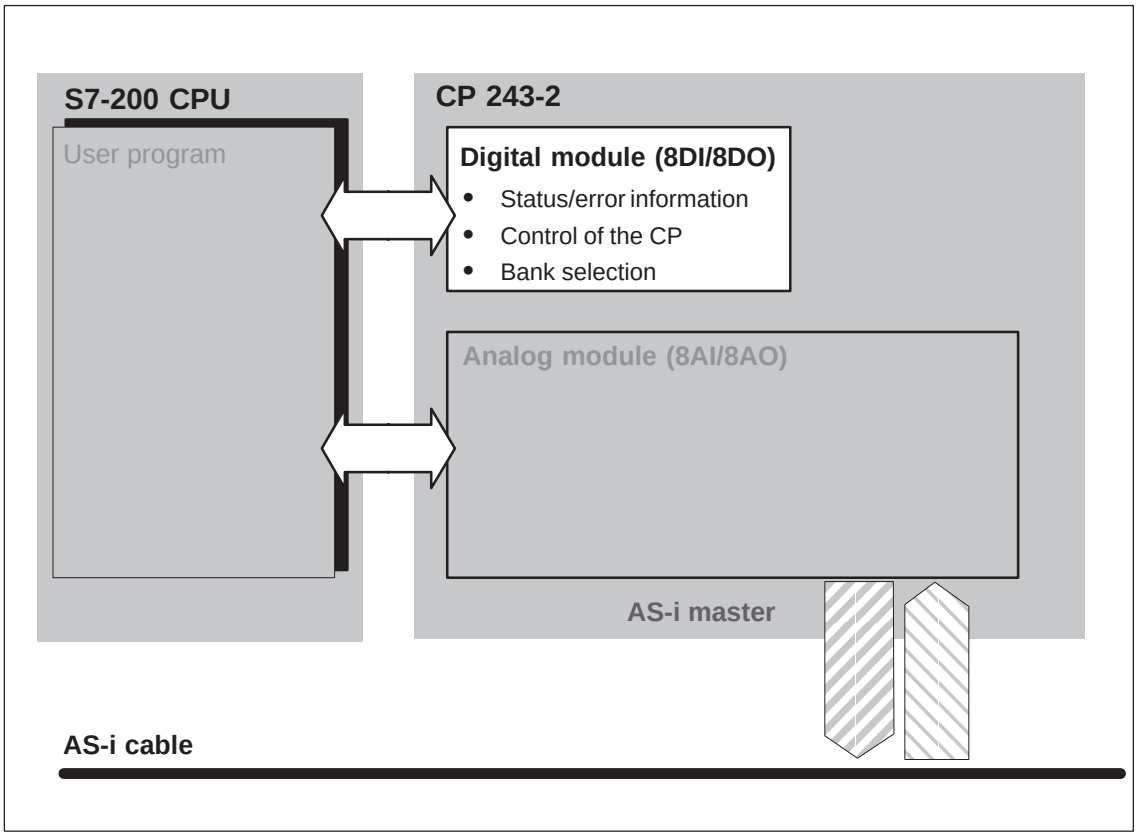


Figure 2-2

2.3.1 Identification Register in the Digital Module

Meaning

The identification register signals the I/O module identifier to indicate the existence of an 8DI/8DO digital module with the value specified below.

The address at which the program can access the identification register depends on the slot in which the CP 243-2 is inserted.

For further information about the special bit memory and its structure for I/O modules, refer to /4/.

Range of Values

The identification register can be read via the special bit memory of the S7-200 CPU. It provides the fixed value **05H**.

Example

Assuming that the CP 243-2 is inserted directly beside the S7-200 CPU.

The content of the identification register can be read from SMB8.

2.3.2 Error Register in the Digital Module

Meaning for the User Program

This register always supplies the value ”0”. The CP 243–2 reports errors using the error register in the analog module (see Section 2.4.2).

Example of Access to the Error Register

If the CP 243–2 is inserted directly beside the S7–200 CPU, SMB9 constantly supplies the value ”0”.

2.3.3 Status Byte (Input Register 8DI)

Meaning for the User Program

This register shows the status of the CP 243-2 relative to the AS-i master interface.

Structure of the Status Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	**ASI_RESP**	0	0	0	0	**CP_READY**	**ASI_MODE**

Description of the Bits

Table 2-1

Bit	Value	Meaning
ASI_MODE	0	The CP 243-2 is in the protected mode.
	1	The CP 243-2 is in the configuration mode.
CP_READY	0	The CP 243-2 is not yet operational after turning on the power supply. Evaluation of the I/O data or other information from the CP is not permitted.
	1	The CP 243-2 is operational.
ASI_RESP	0/1	Response bit for the AS-i command interface (see Section 5.1).

2.3.4 Control Byte (Output Register 8DO)

Meaning for the User Program

The user program controls the data exchange with the CP 243-2 using this register.

Structure of the Control Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PLC_RUN	**ASI_COM**	**BS5**	**BS4**	**BS3**	**BS2**	**BS1**	**BS0**

Description of the Bits

Table 2-2

Bit	Value	Meaning
BS0..BS5	0 ... 63 dec.	Bank select bits for changing the bank in the analog module (see Section 2.5).
ASI_COM	0/1	Job bit for the AS-i command interface (see Section 5.1).
PLC_RUN	In the STOP mode of the S7-200 CPU, the CP must send defined values to all AS-i slaves (see Chapter 3). Since the AS-i slave data are transferred via the analog area and the S7-200 CPU does not set this area to ’0’ when it changes from RUN to STOP, the CPU mode must be signaled to the CP 243-2 using the PLC_RUN bit as follows:	
	0	Signal to the CP 243-2 that the S7-200 CPU is in the STOP mode. The CP 243-2 sends ’0’ to all AS-i binary slaves. The analog value transfer to analog output slaves is interrupted. The S7-200 CPU sets the bit automatically to “0” at a change from RUN to STOP.
	1	Signals to the CP 243-2 that the S7-200 CPU is in the RUN mode. The CP 243-2 sends the content of output bank 0 to all AS-i slaves (see Section 2.4). The user program must set this bit to “1” during startup (first scan). **Do not set the PLC_RUN bit permanently to “1” with the S7-200 operating system functions such as “CPU configuration/setting the outputs” or “force outputs”.**

2.4 Meaning of the Data in the Analog Module

Overview

The analog module of the CP 243-2 consists of four areas:

- Identification register, 8 bits (I/O module identifier)
- Error register, 8 bits
- 8 analog input words (8 AI)
- 8 analog output words (8 AO)

The most important functions handled via these areas are shown in the diagram below:

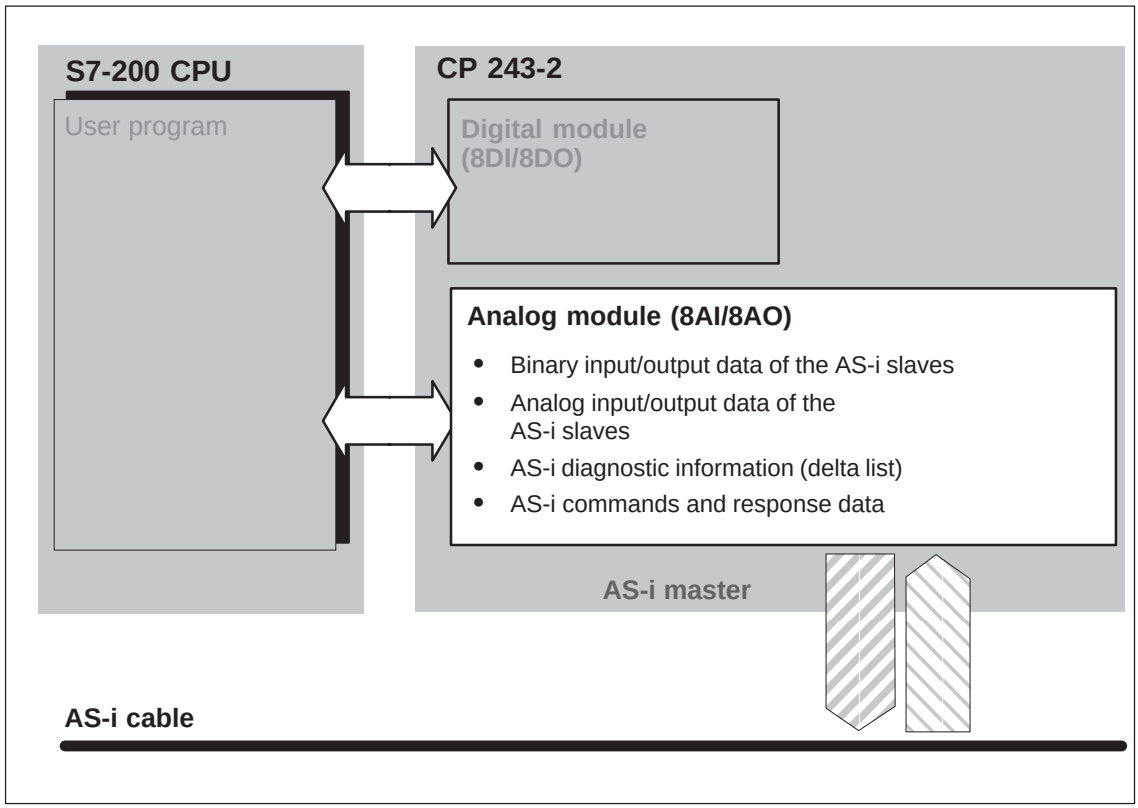


Figure 2-3

2.4.1 Identification Register in the Analog Module

Meaning

The identification register signals the I/O module identifier to indicate the existence of an 8AI/8AO analog module with the value specified below.

The address at which the program can access the identification register depends on the slot in which the CP 243-2 is inserted.

For further information about the special bit memory and its structure for I/O modules refer to /4/.

Range of Values

The identification register can be read via the special bit memory area of the S7-200 CPU. It provides the fixed value **1FH**.

Example

Assuming that the CP 243-2 is inserted directly beside the S7-200 CPU.

The content of the identification register can be read via SMB 10.

2.4.2 Error Register in the Analog Module

Meaning for the User Program

With this register, the CP 243-2 signals errors to the user program.

Structure of the Error Register

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	0	0	**APF**	0	**CER**

Bit Description/Range of Values

Table 2-3

Bit	Value	Meaning
CER	0	AS-i configuration correct (only in the protected mode) The “CER” LED is off
	1	AS-i configuration error (only in the protected mode) This indicates a difference between the slave configuration detected on the AS-i cable and the desired configuration configured on the CP 243-2. The “CER” LED is lit (see Section 1.8.1 Status Display of the CP 243-2).
APF	0	AS-i voltage correct The “APF” LED is off.
	1	AS-i Power Fail. This indicates that the voltage supplied on the AS-i cable by the AS-i power supply unit is too low or there is a complete power outage. The “APF” LED is lit (see Section 1.8.1 Status Display of the CP 243-2).

Note

The “CER” bit indicates configuration errors only in the protected mode. In the configuration mode, the “CER” bit is always “0”.

The “CER” LED, on the other hand, indicates configuration errors both in the configuration mode and in the protected mode.

Example of Access to the Error Register

Assuming that the CP 243-2 is inserted directly beside the S7-200 CPU.

Evaluate the special memory bits SM 11.0 to SM 11.2 in the SM area (for more information about the special bit memory area of the S7-200 CPU, refer to /4/).

If an error has occurred, bit SM 11.0 and/or bit SM 11.2 is set.

2.5 Access to the Analog Input and Output Words

Principle

Using a bank-select mechanism, the 8 analog input words and the 8 analog output words can be switched to 64 different analog input areas (banks) and 64 different analog output areas (banks) on the CP 243-2.

Each of these banks is 8 words long.

Advantage

This bank-select mechanism has the advantage that the analog data area of 8 words available for the expansion module is increased according to the number of banks.

Access in the User Program

The switchover to the various banks is made using bits BS0–BS5 in the control byte of the CP 243-2 (see Section 2.3.4).

The bank select bits are binary coded and select banks as shown below:

BS5	BS4	BS3	BS2	BS1	BS0	Bank No.
0	0	0	0	0	0	Bank 0 selected
0	0	0	0	0	1	Bank 1 selected
0	0	0	0	1	0	Bank 2 selected
0	0	0	0	1	1	Bank 3 selected
0	0	0	1	0	0	Bank 4 selected
0	0	0	1	0	1	Bank 5 selected
0	0	0	1	1	0	Bank 6 selected
0	0	0	1	1	1	Bank 7 selected
0	0	1	0	0	0	Bank 8 selected
0	0	1	0	0	1	Bank 9 selected
0	0	1	0	1	0	Bank 10 selected
0	0	1	0	1	1	Bank 11 selected
0	0	1	1	0	0	Bank 12 selected
0	0	1	1	0	1	Bank 13 selected
0	0	1	1	1	0	Bank 14 selected
0	0	1	1	1	1	Bank 15 selected
0	1	0	0	0	0	Bank 16 selected
0	1	0	0	0	1	Bank 17 selected
0	1	0	0	1	0	Bank 18 selected
0	1	0	0	1	1	Bank 19 selected
0	1	0	1	0	0	Bank 20 selected
0	1	0	1	0	1	Bank 21 selected
0	1	0	1	1	0	Bank 22 selected
0	1	0	1	1	1	Bank 23 selected
0	1	1	0	0	0	Bank 24 selected
0	1	1	0	0	1	Bank 25 selected

BS5	BS4	BS3	BS2	BS1	BS0	Bank No.
0	1	1	0	1	0	Bank 26 selected
0	1	1	0	1	1	Bank 27 selected
0	1	1	1	0	0	Bank 28 selected
0	1	1	1	0	1	Bank 29 selected
0	1	1	1	1	0	Bank 30 selected
0	1	1	1	1	1	Bank 31 selected
1	0	0	0	0	0	Bank 32 selected
1	0	0	0	0	1	Bank 33 selected
1	0	0	0	1	0	Bank 34 selected
1	0	0	0	1	1	Bank 35 selected
1	0	0	1	0	0	Bank 36 selected
1	0	0	1	0	1	Bank 37 selected
1	0	0	1	1	0	Bank 38 selected
1	0	0	1	1	1	Bank 39 selected
1	0	1	0	0	0	Bank 40 selected
1	0	1	0	0	1	Bank 41 selected
1	0	1	0	1	0	Bank 42 selected
1	0	1	0	1	1	Bank 43 selected
1	0	1	1	0	0	Bank 44 selected
1	0	1	1	0	1	Bank 45 selected
1	0	1	1	1	0	Bank 46 selected
1	0	1	1	1	1	Bank 47 selected
1	1	0	0	0	0	Bank 48 selected
1	1	0	0	0	1	Bank 49 selected
1	1	0	0	1	0	Bank 50 selected
1	1	0	0	1	1	Bank 51 selected
1	1	0	1	0	0	Bank 52 selected
1	1	0	1	0	1	Bank 53 selected
1	1	0	1	1	0	Bank 54 selected
1	1	0	1	1	1	Bank 55 selected
1	1	1	0	0	0	Bank 56 selected
1	1	1	0	0	1	Bank 57 selected
1	1	1	0	1	0	Bank 58 selected
1	1	1	0	1	1	Bank 59 selected
1	1	1	1	0	0	Bank 60 selected
1	1	1	1	0	1	Bank 61 selected
1	1	1	1	1	0	Bank 62 selected
1	1	1	1	1	1	Bank 63 selected

Caution

Make sure that the value of the bank select bits is located not only in the process output image but that it is also transferred to the CP 243-2 before you access the corresponding bank (see example in Table 5-1).

2.5.1 Analog Input Area

Assignment of the Input Areas

The input area of the analog module of the CP 243-2 is mapped to the analog inputs of the user program using bank selection as shown below:

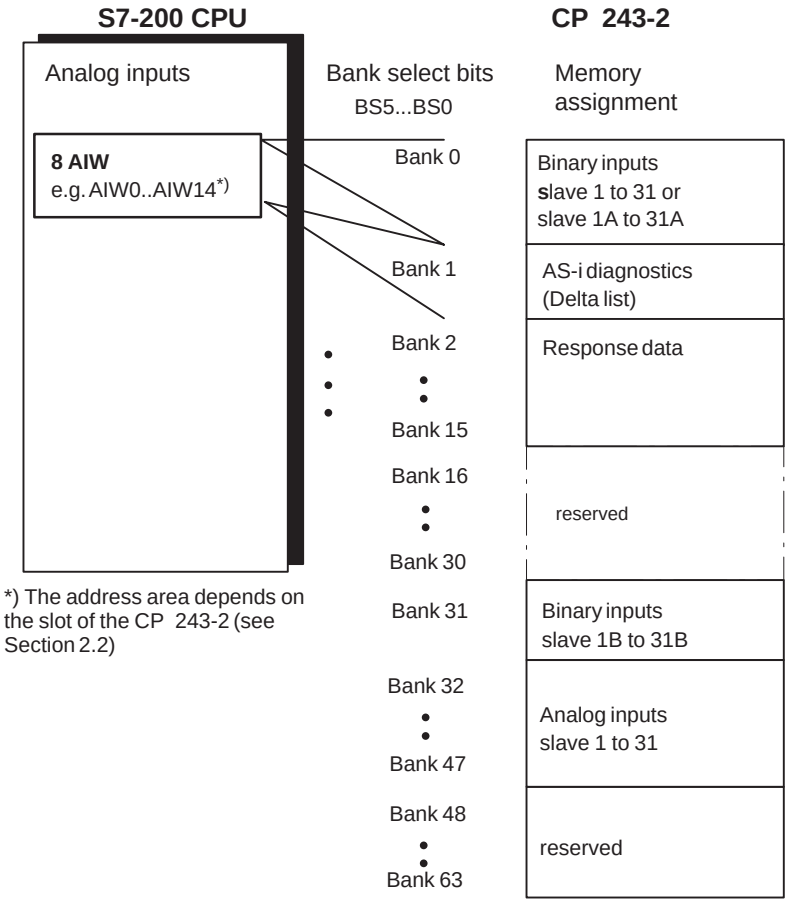


Figure 2-4

The bank select bits are set in the control byte of the digital module by the user program (see Section 2.3.4).

Bank 0: Binary input data of the AS-i slaves 1 to 31 or 1A to 31A

With this analog input words, you can access the binary inputs of the standard slaves or A slaves (slaves with extended addressing mode).

The structure of the input data is described in Section 3.1.

Bank 1: Diagnostics on the AS-Interface

The delta list of the AS-i slaves is indicated in this bank.

The delta list contains deviations of the existing AS-i slaves from the configuration on the CP 243-2.

A set bit can indicate the following:

- Missing slaves
- Extra slaves (not in the configuration)
- Slaves with incorrect I0/ID coding

The delta list is updated both in the configuration and in the protected mode.

The bytes and bits of the delta list are ordered as shown in the table below.
(m: start address of the analog input area of the CP 243-2)

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

Banks 2–15: Response data on the AS-Interface

These banks contain the response data of the command calls. The data structures used and the codings are described in Section 5.2. The number of banks used depends on the particular command.

Banks 16–30: Reserved area

These areas are reserved for later expansions and cannot be used.

Bank 31: Binary input data of the AS-i slaves 1B – 31B

Via these analog input words, you have access to the binary inputs of the B slaves (slaves with the extended addressing mode).

The structure of the input data is described in Section 3.1.

Banks 32–47: Analog input data of the AS-i slaves

Via these areas, you can access the analog input data of the AS-i slaves that support the AS-i slave profile 7.3 or 7.4 (see Section 3.1.2).

Banks 48–63: Reserved area

These areas are reserved for later expansions and cannot be used.

2.5.2 Analog Output Area

Assignment of the Output Areas

The output area of the analog module of the CP 243-2 is mapped to the analog outputs of the user program using bank selection as shown below:

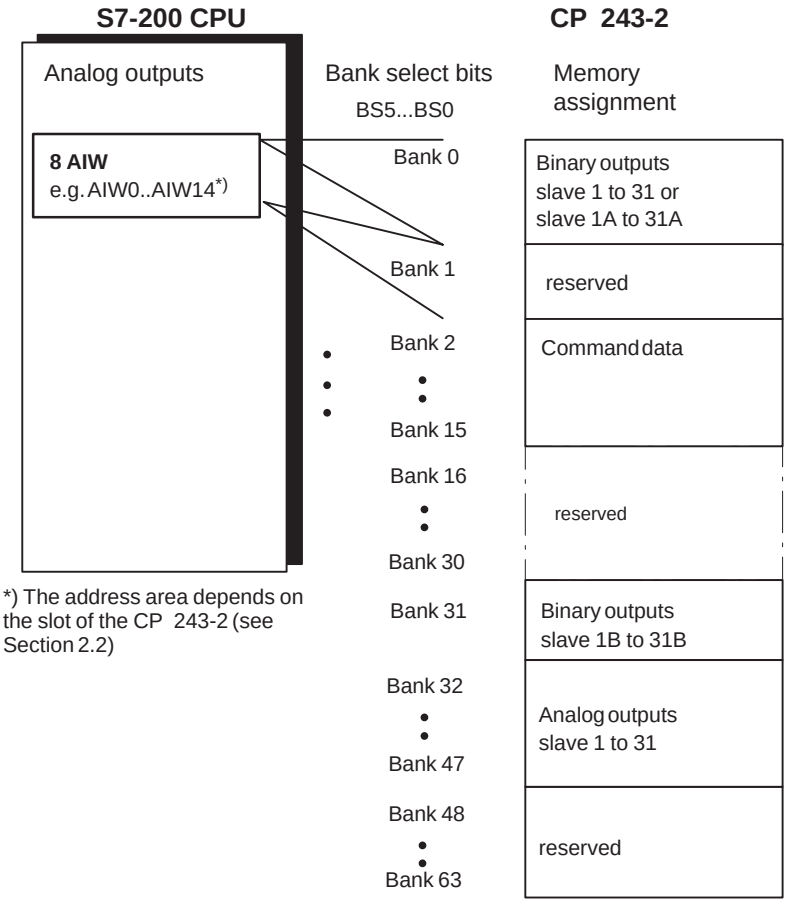


Figure 2-5

Bank 0: Binary output data of the AS-i slaves 1 to 31 or 1A to 31A

Via these analog output words, you can access the binary outputs of the standard slaves or A slaves (slaves with the extended addressing mode).

The structure of the output data is described in Section 3.1.

Bank 1: reserved

This area is reserved for later expansions and cannot be used.

Banks 2–15: Command data on the AS-Interface

Via this area, you can store command calls on the CP 243-2. The data structures and codes used are described in Section 5.2. The number of banks used depends on the particular command.

Banks 16–30: Reserved area

These areas are reserved for later expansions and cannot be used.

Bank 31: Binary output data of the AS-i slaves 1B – 31B

Using these analog output words, you can access the binary outputs of the B slaves (slaves with the extended addressing mode).

The structure of the output data is described in Section 3.1.2.

Banks 32–47: Analog output data of the AS-i slaves

Via these areas, you can access the analog binary outputs of AS-i slaves that support the AS-i slave profile 7.3 or 7.4 (see Section 3.1.2).

Banks 48–63: Reserved area

These areas are reserved for later expansions and cannot be used.

❑

Access to the Data of the AS-i Slaves 3

This chapter explains the AS-i master interface of the CP 243-2. The first part covers addressing the AS-i slaves and access to the binary data of the slaves.

In the second part, addressing and access to the analog data of the AS-i slaves is explained.

3.1 Access to the Binary Data of the AS-i Slaves

3.1.1 Addressing the AS-i Slaves in the User Program

Requirements

Before you can access the I/O data of the AS-i slaves, the following requirements must be met:

- Deactivate the filtering of the analog inputs for the CP 243–2 in the system data block of the S7–200 CPU.
- Set the “PLC_RUN” bit (bit 7) in the digital control byte to ’1’ at the beginning of the cyclic program.
- Access to the I/O data of the slaves is then only allowed when the “CP_Ready” bit (bit 1) in the digital status byte is set to ’1’.

Access to the Binary Values

The CP 243-2 assigns four bits (a nibble) in the input and output data area for each AS-i slave. The PLC can write (slave output data) and read (slave input data) this nibble.

This allows bi-directional slaves to be addressed.

Assignment of the AS-i Input Data of the Standard or A Slaves (Bank 0 in the Analog Input Area of the CP)

Bank	Byte no.	Bit 7–4	Bit 3–0
0	m+0	reserved	Slave 1 or slave 1A Bit 3 | Bit 2 | Bit 1 | Bit 0
0	m+1	Slave 2 or slave 2A	Slave 3 or slave 3A
0	m+2	Slave 4 or slave 4A	Slave 5 or slave 5A
0	m+3	Slave 6 or slave 6A	Slave 7 or slave 7A
0	m+4	Slave 8 or slave 8A	Slave 9 or slave 9A
0	m+5	Slave 10 or slave 10A	Slave 11 or slave 11A
0	m+6	Slave 12 or slave 12A	Slave 13 or slave 13A
0	m+7	Slave 14 or slave 14A	Slave 15 or slave 15A
0	m+8	Slave 16 or slave 16A	Slave 17 or slave 17A
0	m+9	Slave 18 or slave 18A	Slave 19 or slave 19A
0	m+10	Slave 20 or slave 20A	Slave 21 or slave 21A
0	m+11	Slave 22 or slave 22A	Slave 23 or slave 23A
0	m+12	Slave 24 or slave 24A	Slave 25 or slave 25A
0	m+13	Slave 26 or slave 26A	Slave 27 or slave 27A
0	m+14	Slave 28 or slave 28A	Slave 29 or slave 29A
0	m+15	Slave 30 or slave 30A Bit 3 | Bit 2 | Bit 1 | Bit 0	Slave 31 or slave 31A Bit 3 | Bit 2 | Bit 1 | Bit 0

m = start address of the CP analog module in the input direction

Assignment of the AS-i Output Data of the Standard or A Slaves (Bank 0 in the Analog Output Area of the CP)

Bank	Byte no.	Bit 7–4	Bit 3–0
0	n+0	reserved	Slave 1 or slave 1A Bit 3 | Bit 2 | Bit 1 | Bit 0
0	n+1	Slave 2 or slave 2A	Slave 3 or slave 3A
0	n+2	Slave 4 or slave 4A	Slave 5 or slave 5A
0	n+3	Slave 6 or slave 6A	Slave 7 or slave 7A
0	n+4	Slave 8 or slave 8A	Slave 9 or slave 9A
0	n+5	Slave 10 or slave 10A	Slave 11 or slave 11A
0	n+6	Slave 12 or slave 12A	Slave 13 or slave 13A
0	n+7	Slave 14 or slave 14A	Slave 15 or slave 15A
0	n+8	Slave 16 or slave 16A	Slave 17 or slave 17A
0	n+9	Slave 18 or slave 18A	Slave 19 or slave 19A
0	n+10	Slave 20 or slave 20A	Slave 21 or slave 21A
0	n+11	Slave 22 or slave 22A	Slave 23 or slave 23A
0	n+12	Slave 24 or slave 24A	Slave 25 or slave 25A
0	n+13	Slave 26 or slave 26A	Slave 27 or slave 27A
0	n+14	Slave 28 or slave 28A	Slave 29 or slave 29A
0	n+15	Slave 30 or slave 30A Bit 3 | Bit 2 | Bit 1 | Bit 0	Slave 31 or slave 31A Bit 3 | Bit 2 | Bit 1 | Bit 0

n = start address of the CP analog module in the output direction

Assignment of the AS-i Input Data of the B Slaves (Bank 31 in the Analog Input Direction of the CP)

Bank	Byte no.	Bit 7–4	Bit 3–0
31	m+0	reserved	Slave 1B Bit 3 | Bit 2 | Bit 1 | Bit 0
31	m+1	Slave 2B	Slave 3B
31	m+2	Slave 4B	Slave 5B
31	m+3	Slave 6B	Slave 7B
31	m+4	Slave 8B	Slave 9B
31	m+5	Slave 10B	Slave 11B
31	m+6	Slave 12B	Slave 13B
31	m+7	Slave 14B	Slave 15B
31	m+8	Slave 16B	Slave 17B
31	m+9	Slave 18B	Slave 19B
31	m+10	Slave 20B	Slave 21B
31	m+11	Slave 22B	Slave 23B
31	m+12	Slave 24B	Slave 25B
31	m+13	Slave 26B	Slave 27B
31	m+14	Slave 28B	Slave 29B
31	m+15	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 CP analog module in the input direction

Assignment of the AS-i Output Data of the B Slaves (Bank 31 in the Analog Output Area of the CP)

Bank	Byte No.	Bit 7–4	Bit 3–0
31	n+0	reserved	Slave 1B Bit 3 | Bit 2 | Bit 1 | Bit 0
31	n+1	Slave 2B	Slave 3B
31	n+2	Slave 4B	Slave 5B
31	n+3	Slave 6B	Slave 7B
31	n+4	Slave 8B	Slave 9B
31	n+5	Slave 10B	Slave 11B
31	n+6	Slave 12B	Slave 13B
31	n+7	Slave 14B	Slave 15B
31	n+8	Slave 16B	Slave 17B
31	n+9	Slave 18B	Slave 19B
31	n+10	Slave 20B	Slave 21B
31	n+11	Slave 22B	Slave 23B
31	n+12	Slave 24B	Slave 25B
31	n+13	Slave 26B	Slave 27B
31	n+14	Slave 28B	Slave 29B
31	n+15	Slave 30B Bit 3 | Bit 2 | Bit 1 | Bit 0	Slave 31B Bit 3 | Bit 2 | Bit 1 | Bit 0

n = start address of the CP analog module in the output direction

Data Exchange in the STOP Mode of the S7-22x CPU

In the STOP mode, the S7-22x CPU sets bit PLC_RUN in the digital control area to “0” automatically. As a result, the CP 243-2 outputs “0” data to all binary slaves.

Special Feature of Analog Slaves

If you use analog slaves complying with profile 7.3 or 7.4 the following points apply:

- In the input direction, the CP 243-2 sets the nibbles assigned to the slaves to “0”.
- In the output direction, the CP 243-2 ignores the nibbles assigned to these slaves.
- Access to the analog data is described in Section 3.1.2.

Example

Figure 3-1 shows an example of the CP 243-2 addressing four AS-i slaves. In the example, m = 0 is the start address for the input data and n = 0 is the start address for the output data.

The bits relevant for the user program (existing AS-i slaves) are shown on a gray background. The bits on a white background are irrelevant for the user program.

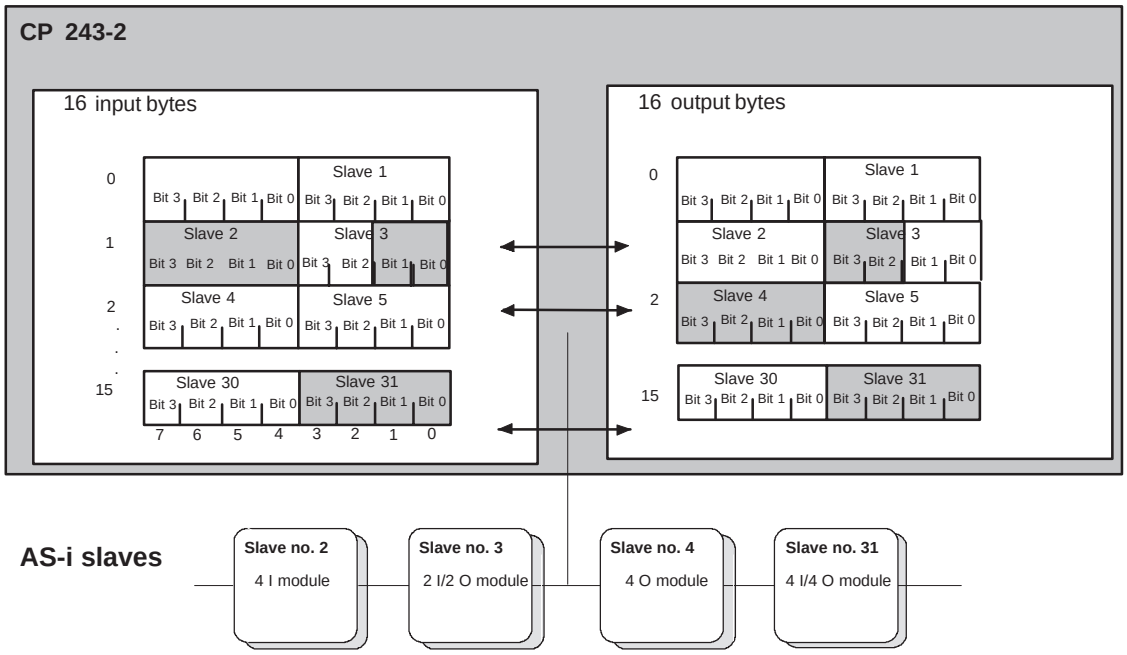
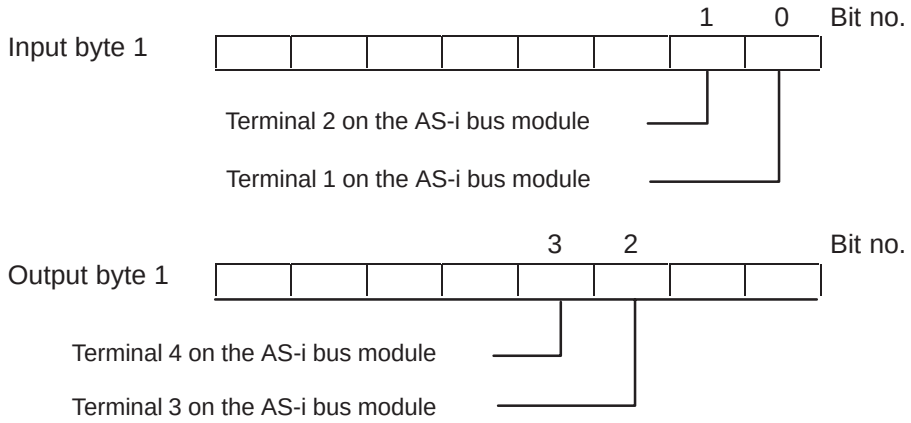


Figure 3-1

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



3.1.2 Access to the AS-i User Data

Data Access with STEP 7 Micro

To access the binary data of the slaves, you use the analog transfer commands of the STEP 7 Micro/WIN32 programming language.

Example

If you want to access individual bits of the slave data, you can use the method shown in the following sample program.

The example created with STEP 7 Micro/WIN32 is valid for a CPU 222 with a CP 243-2 plugged in directly beside it:

OB1 (STL)

```
NETWORK 1
LD    SM0.1                 //If: bit “First Scan”:
SI    Q1.7, 1               //PLC_RUN = 1
LD    I1.1                  //If: CP 243-2_READY
CALL  1                     //Then: AS-i I/O processing (standard or A slaves)
```

SBR 1 (STL)

```
NETWORK 1
LD    SM0.0                 //Always 1
RI    Q1.0,6                //Select bank 0
BMW   AIW0, VW100, 8        //Transfer standard slaves
SI    Q1.0,5                //Select bank 31
BMW   AIW0, VW116, 8        //Transfer B slaves
//Below, several examples of access to AS-i bits
LD    V100.0                //If bit 1 of slave 1
A     V115.1                //And bit 2 of slave 31
A     V116.0                //And bit 1 of slave 1B
=     V203.2                //The bit 3 of slave 7 = 1
LD    SM0.0                 //Always 1
RI    Q1.0,6                //Select bank 0
BMW   VW900, AOW0, 8        //Transfer standard slaves
SI    Q1.0,5                //Select bank 31
BMW   AIW0, AOW0, 8         //Transfer B slaves
```

3.2 Access to the Analog Data of the AS-i Slaves (Slaves complying with Profile 7.3 or 7.4)

3.2.1 Addressing the Analog AS-i Slaves in the User Program

Requirements

Before you can access the I/O data of the AS-i slaves, the following requirements must be met:

- Deactivate the filtering of the analog inputs for the CP 243–2 in the system data block of the S7–200 CPU.
- Set the “PLC_RUN” bit (bit 7) in the digital control byte to ’1’ at the beginning of the cyclic program.
- Access to the I/O data of the slaves is then only allowed when the “CP_Ready” bit (bit 1) in the digital status byte is set to ’1’.

The following explanations do **not** apply to analog slaves complying with profile 7.1 or 7.2. Analog value transfer for these slaves is **not** supported by the CP 243-2.

Access to the Analog Values

The CP 243-2 assigns four words in the input area and four words in the output area for each AS-i slave. The PLC can write these values (analog outputs) or read these values (analog inputs).

Assignment of the AS-i Analog Data

Bank	Byte no.	Meaning
32	0	Slave 1, channel 1, high byte
32	1	Slave 1, channel 1, low byte
32	2	Slave 1, channel 2, high byte
32	3	Slave 1, channel 2, low byte
32	4	Slave 1, channel 3, high byte
32	5	Slave 1, channel 3, low byte
32	6	Slave 1, channel 4, high byte
32	7	Slave 1, channel 4, low byte
32	8	Slave 2, channel 1, high byte
32	9	Slave 2, channel 1, low byte
32	10	Slave 2, channel 2, high byte
32	11	Slave 2, channel 2, low byte
32	12	Slave 2, channel 3, high byte
32	13	Slave 2, channel 3, low byte
32	14	Slave 2, channel 4, high byte
32	15	Slave 2, channel 4, low byte

Bank	Byte no.	Meaning
33	0	Slave 3, channel 1, high byte
33	1	Slave 3, channel 1, low byte
33	2	Slave 3, channel 2, high byte
33	3	Slave 3, channel 2, low byte
33	4	Slave 3, channel 3, high byte
33	5	Slave 3, channel 3, low byte
33	6	Slave 3, channel 4, high byte
33	7	Slave 3, channel 4, low byte
33	8	Slave 4, channel 1, high byte
33	9	Slave 4, channel 1, low byte
33	10	Slave 4, channel 2, high byte
33	11	Slave 4, channel 2, low byte
33	12	Slave 4, channel 3, high byte
33	13	Slave 4, channel 3, low byte
33	14	Slave 4, channel 4, high byte
33	15	Slave 4, channel 4, low byte
34	0	Slave 5, channel 1, high byte
34	1	Slave 5, channel 1, low byte
34	2	Slave 5, channel 2, high byte
34	3	Slave 5, channel 2, low byte
34	4	Slave 5, channel 3, high byte
34	5	Slave 5, channel 3, low byte
34	6	Slave 5, channel 4, high byte
34	7	Slave 5, channel 4, low byte
34	8	Slave 6, channel 1, high byte
34	9	Slave 6, channel 1, low byte
34	10	Slave 6, channel 2, high byte
34	11	Slave 6, channel 2, low byte
34	12	Slave 6, channel 3, high byte
34	13	Slave 6, channel 3, low byte
34	14	Slave 6, channel 4, high byte
34	15	Slave 6, channel 4, low byte
35	0	Slave 7, channel 1, high byte
35	1	Slave 7, channel 1, low byte
35	2	Slave 7, channel 2, high byte
35	3	Slave 7, channel 2, low byte
35	4	Slave 7, channel 3, high byte
35	5	Slave 7, channel 3, low byte
35	6	Slave 7, channel 4, high byte
35	7	Slave 7, channel 4, low byte
35	8	Slave 8, channel 1, high byte
35	9	Slave 8, channel 1, low byte
35	10	Slave 8, channel 2, high byte
35	11	Slave 8, channel 2, low byte
35	12	Slave 8, channel 3, high byte
35	13	Slave 8, channel 3, low byte
35	14	Slave 8, channel 4, high byte
35	15	Slave 8, channel 4, low byte
36	0	Slave 9, channel 1, high byte

Bank	Byte no.	Meaning
36	1	Slave 9, channel 1, low byte
36	2	Slave 9, channel 2, high byte
36	3	Slave 9, channel 2, low byte
36	4	Slave 9, channel 3, high byte
36	5	Slave 9, channel 3, low byte
36	6	Slave 9, channel 4, high byte
36	7	Slave 9, channel 4, low byte
36	8	Slave 10, channel 1, high byte
36	9	Slave 10, channel 1, low byte
36	10	Slave 10, channel 2, high byte
36	11	Slave 10, channel 2, low byte
36	12	Slave 10, channel 3, high byte
36	13	Slave 10, channel 3, low byte
36	14	Slave 10, channel 4, high byte
36	15	Slave 10, channel 4, low byte
37	0	Slave 11, channel 1, high byte
37	1	Slave 11, channel 1, low byte
37	2	Slave 11, channel 2, high byte
37	3	Slave 11, channel 2, low byte
37	4	Slave 11, channel 3, high byte
37	5	Slave 11, channel 3, low byte
37	6	Slave 11, channel 4, high byte
37	7	Slave 11, channel 4, low byte
37	8	Slave 12, channel 1, high byte
37	9	Slave 12, channel 1, low byte
37	10	Slave 12, channel 2, high byte
37	11	Slave 12, channel 2, low byte
37	12	Slave 12, channel 3, high byte
37	13	Slave 12, channel 3, low byte
37	14	Slave 12, channel 4, high byte
37	15	Slave 12, channel 4, low byte
38	0	Slave 13, channel 1, high byte
38	1	Slave 13, channel 1, low byte
38	2	Slave 13, channel 2, high byte
38	3	Slave 13, channel 2, low byte
38	4	Slave 13, channel 3, high byte
38	5	Slave 13, channel 3, low byte
38	6	Slave 13, channel 4, high byte
38	7	Slave 13, channel 4, low byte
38	8	Slave 14, channel 1, high byte
38	9	Slave 14, channel 1, low byte
38	10	Slave 14, channel 2, high byte
38	11	Slave 14, channel 2, low byte
38	12	Slave 14, channel 3, high byte
38	13	Slave 14, channel 3, low byte
38	14	Slave 14, channel 4, high byte
38	15	Slave 14, channel 4, low byte
39	0	Slave 15, channel 1, high byte
39	1	Slave 15, channel 1, low byte

Bank	Byte no.	Meaning
39	2	Slave 15, channel 2, high byte
39	3	Slave 15, channel 2, low byte
39	4	Slave 15, channel 3, high byte
39	5	Slave 15, channel 3, low byte
39	6	Slave 15, channel 4, high byte
39	7	Slave 15, channel 4, low byte
39	8	Slave 16, channel 1, high byte
39	9	Slave 16, channel 1, low byte
39	10	Slave 16, channel 2, high byte
39	11	Slave 16, channel 2, low byte
39	12	Slave 16, channel 3, high byte
39	13	Slave 16, channel 3, low byte
39	14	Slave 16, channel 4, high byte
39	15	Slave 16, channel 4, low byte
40	0	Slave 17, channel 1, high byte
40	1	Slave 17, channel 1, low byte
40	2	Slave 17, channel 2, high byte
40	3	Slave 17, channel 2, low byte
40	4	Slave 17, channel 3, high byte
40	5	Slave 17, channel 3, low byte
40	6	Slave 17, channel 4, high byte
40	7	Slave 17, channel 4, low byte
40	8	Slave 18, channel 1, high byte
40	9	Slave 18, channel 1, low byte
40	10	Slave 18, channel 2, high byte
40	11	Slave 18, channel 2, low byte
40	12	Slave 18, channel 3, high byte
40	13	Slave 18, channel 3, low byte
40	14	Slave 18, channel 4, high byte
40	15	Slave 18, channel 4, low byte
41	0	Slave 19, channel 1, high byte
41	1	Slave 19, channel 1, low byte
41	2	Slave 19, channel 2, high byte
41	3	Slave 19, channel 2, low byte
41	4	Slave 19, channel 3, high byte
41	5	Slave 19, channel 3, low byte
41	6	Slave 19, channel 4, high byte
41	7	Slave 19, channel 4, low byte
41	8	Slave 20, channel 1, high byte
41	9	Slave 20, channel 1, low byte
41	10	Slave 20, channel 2, high byte
41	11	Slave 20, channel 2, low byte
41	12	Slave 20, channel 3, high byte
41	13	Slave 20, channel 3, low byte
41	14	Slave 20, channel 4, high byte
41	15	Slave 20, channel 4, low byte
42	0	Slave 21, channel 1, high byte
42	1	Slave 21, channel 1, low byte
42	2	Slave 21, channel 2, high byte

Bank	Byte no.	Meaning
42	3	Slave 21, channel 2, low byte
42	4	Slave 21, channel 3, high byte
42	5	Slave 21, channel 3, low byte
42	6	Slave 21, channel 4, high byte
42	7	Slave 21, channel 4, low byte
42	8	Slave 22, channel 1, high byte
42	9	Slave 22, channel 1, low byte
42	10	Slave 22, channel 2, high byte
42	11	Slave 22, channel 2, low byte
42	12	Slave 22, channel 3, high byte
42	13	Slave 22, channel 3, low byte
42	14	Slave 22, channel 4, high byte
42	15	Slave 22, channel 4, low byte
43	0	Slave 23, channel 1, high byte
43	1	Slave 23, channel 1, low byte
43	2	Slave 23, channel 2, high byte
43	3	Slave 23, channel 2, low byte
43	4	Slave 23, channel 3, high byte
43	5	Slave 23, channel 3, low byte
43	6	Slave 23, channel 4, high byte
43	7	Slave 23, channel 4, low byte
43	8	Slave 24, channel 1, high byte
43	9	Slave 24, channel 1, low byte
43	10	Slave 24, channel 2, high byte
43	11	Slave 24, channel 2, low byte
43	12	Slave 24, channel 3, high byte
43	13	Slave 24, channel 3, low byte
43	14	Slave 24, channel 4, high byte
43	15	Slave 24, channel 4, low byte
44	0	Slave 25, channel 1, high byte
44	1	Slave 25, channel 1, low byte
44	2	Slave 25, channel 2, high byte
44	3	Slave 25, channel 2, low byte
44	4	Slave 25, channel 3, high byte
44	5	Slave 25, channel 3, low byte
44	6	Slave 25, channel 4, high byte
44	7	Slave 25, channel 4, low byte
44	8	Slave 26, channel 1, high byte
44	9	Slave 26, channel 1, low byte
44	10	Slave 26, channel 2, high byte
44	11	Slave 26, channel 2, low byte
44	12	Slave 26, channel 3, high byte
44	13	Slave 26, channel 3, low byte
44	14	Slave 26, channel 4, high byte
44	15	Slave 26, channel 4, low byte
45	0	Slave 27, channel 1, high byte
45	1	Slave 27, channel 1, low byte
45	2	Slave 27, channel 2, high byte
45	3	Slave 27, channel 2, low byte

Bank	Byte no.	Meaning
45	4	Slave 27, channel 3, high byte
45	5	Slave 27, channel 3, low byte
45	6	Slave 27, channel 4, high byte
45	7	Slave 27, channel 4, low byte
45	8	Slave 28, channel 1, high byte
45	9	Slave 28, channel 1, low byte
45	10	Slave 28, channel 2, high byte
45	11	Slave 28, channel 2, low byte
45	12	Slave 28, channel 3, high byte
45	13	Slave 28, channel 3, low byte
45	14	Slave 28, channel 4, high byte
45	15	Slave 28, channel 4, low byte
46	0	Slave 29, channel 1, high byte
46	1	Slave 29, channel 1, low byte
46	2	Slave 29, channel 2, high byte
46	3	Slave 29, channel 2, low byte
46	4	Slave 29, channel 3, high byte
46	5	Slave 29, channel 3, low byte
46	6	Slave 29, channel 4, high byte
46	7	Slave 29, channel 4, low byte
46	8	Slave 30, channel 1, high byte
46	9	Slave 30, channel 1, low byte
46	10	Slave 30, channel 2, high byte
46	11	Slave 30, channel 2, low byte
46	12	Slave 30, channel 3, high byte
46	13	Slave 30, channel 3, low byte
46	14	Slave 30, channel 4, high byte
46	15	Slave 30, channel 4, low byte
47	0	Slave 31, channel 1, high byte
47	1	Slave 31, channel 1, low byte
47	2	Slave 31, channel 2, high byte
47	3	Slave 31, channel 2, low byte
47	4	Slave 31, channel 3, high byte
47	5	Slave 31, channel 3, low byte
47	6	Slave 31, channel 4, high byte
47	7	Slave 31, channel 4, low byte
47	8	reserved
47	9	reserved
47	10	reserved
47	11	reserved
47	12	reserved
47	13	reserved
47	14	reserved
47	15	reserved

Read access: Read analog input data from AS-i slaves

Write access: Write analog output data to AS-i slaves

Representation of the Analog Values

The analog values must be interpreted complying with slave profile 7.3 or 7.4 as 16-bit values in two's complement.

For further information about the range of values, measuring range, accuracy etc., refer to the relevant documentation of the analog slaves.

Special Situations

In the input direction, the CP 243-2 supplies the value $7FFF_H$ when,

- the AS-i slave does not exist, has failed, or is not an analog slave complying with profile 7.3 or 7.4;
- the channel number is not supported by the slave;
- The slave signals "Value Invalid".

In the input direction, the CP 243-2 supplies the value 0000_H when the AS-i slave supplies transparent data complying with profile 7.3 (extended ID2 code, bit 2=1) and when

- this slave has failed
- this slave signals "Value Invalid".

In the output direction, the CP 243-2 behaves as follows:

In the STOP mode of the PLC (more exactly: bit PLC_RUN = 0), the CP 243-2 stops transfer of the analog values. The reaction of the analog slave depends on the particular manufacturer.

When the CP 243-2 starts up, all analog values have the default $7FFF_H$. This value is, however, only sent after the bit PLC_RUN changes from "0" to "1".

Caution

To ensure the consistency of the analog values, the CP 243-2 does not update the analog input and analog output values as long as the bank select bit BS5 = 1.

Immediately after a read or write access to the analog values it is best to set all bank select bits to "0".

3.2.2 Access to the AS-i Analog Data

Data Access with STEP 7 Micro

You access the analog data of the AS-i slaves using the analog commands of the “STEP 7 Micro/WIN32” programming language.

Example

The following example shown in STL is valid for a CPU 222 with a CP 243-2 plugged in directly beside it. The program reads the analog input value of slave 3 (channel 2) cyclically and sends it to the analog output slave 16 (channel 1).

OB1 (STL)

```
NETWORK 1
LD    SM0.1              //If: bit “First Scan”:
SI    Q1.7, 1            //PLC_RUN = 1
LD    I1.1               //If: CP 243-2_READY
CALL  4                  //Then : process AS-i analog values
```

SBR 4 (STL)

```
NETWORK 1
LD    SM0.0              //Always 1
RI    Q1.0,6             //Select bank 33
SI    Q1.5,1             //Select bank 33
SI    Q1.0,1             //Select bank 33
MOVW  AIW10,  VW50       //Read slave 4, channel 2
RI    Q1.0,1             //Select bank 40
SI    Q1.3,1             //Select bank 40
MOVW  VW50,  AOW0        //Write slave 17, channel 1
RI    Q1.0,6             //Important: deselect the analog bank
```

❑

Signaling Errors and Diagnostics in the User Program

4

This chapter explains which errors of the CP 243-2 are signaled and how to read out the Delta list.

4.1 Signaling

Error Signaling

If the CP 243-2 recognizes errors on the AS-Interface (AS-i slave failure, AS-i Power Failure) during operation, it signals these errors by resetting the input data of the affected slave and by setting the corresponding bit in the error register in the SM area (Special Memory).

The SM byte addresses depend on the slot of the CP 243-2.

Caution

Note that the operating system of the S7-200 CPU does not always update the error register in the SM area before a program cycle. For this reason, it is possible that the input data of a binary AS-i slave are set to ’0’ although no error is signaled in the error register.

If you require a consistent view of the input data, error bits and the delta list for programming your system, you can achieve this using the “Read Data and Delta List” command (see Section 5.2.32).

4.2 Example: Reading the Delta List

STL Example

The following example in STL applies to a CPU 222 with a CP 243-2 plugged in directly beside it:

If an AS-i configuration error occurs in the protected mode, the CP 243-2 sets bits SM 9.0 and SM 11.0 (both bits provide the user with the same information: AS-i configuration errors).

To obtain more detailed information (which slave has failed), you can read in the delta list via bank 1 of the analog input area (see Section 2.5.1).

Table 4-1

OB1 (STL)

```
NETWORK 1
LD    SM0.1                 //If: bit “First Scan”:
SI    Q1.7, 1               //PLC_RUN = 1
RI    Q1.0, 6               //Select bank 0
LD    I1.1                  //If: CP_READY
CALL  2                     //Then: AS-i diagnostics
```

SBR 2 (STL)

```
NETWORK 1                   //Read delta list
LD    SM0.0                 //Always 1
=I    Q1.0                  //Select bank 1
BMW   AIW0, VW316, 4        //Read delta list
NOT
=I    Q1.0                  //Select bank 0
//Below, there are several accesses to the delta list:
LD    V316.1                //If slave 1 has failed
O     V319.7                //Or if slave 31 has failed
=     Q0.0                  //Then CPU output bit = 1
```

❑

Command Interface

5

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

This chapter introduces you to the AS-i command interface and the AS-i commands.

You require the AS-i command interface when you want to use functions over and above pure I/O data exchange with the AS-i slaves (for example assigning parameters to slaves from within the S7-200 program, modifying slave addresses etc.).

5.1 Command interface of the CP 243-2

Command Buffer and Response Buffer

Command calls are made to the CP 243-2 from within the user program. You specify the command call in a command buffer and start the job.

The command buffer is in the analog output area of the CP 243-2 (for example starting at AQW0 if the CP 243-2 is plugged in directly beside an S7-200 CPU). Depending on the command to be executed (see Section 5.2), the response data occupy banks 2 to 15 in the analog output area of the CP 243-2.

On completion of the job, the job status and any response data are made available in a response buffer.

The response buffer is in the analog input area of the CP 243-2 (for example starting at AIW0 if the CP 243-2 is plugged in directly beside an S7-200 CPU). Depending on the command that was executed, the response data occupy banks 2 to 15 in the analog input area of the CP 243-2.

Requirements

Remember that the following requirements must be met before a command call is sent from within the user program:

- Deactivate the filtering of the analog inputs for the CP 243–2 in the system data block of the S7–200 CPU.
- By setting the bit CP_READY = “1” in the status byte, the CP 243-2 signals that it is ready for operation after the power supply is turned on.

Command Sequence

The diagram below shows the following:

- How to execute commands in the user program
- How the CP 243-2 reacts to a command

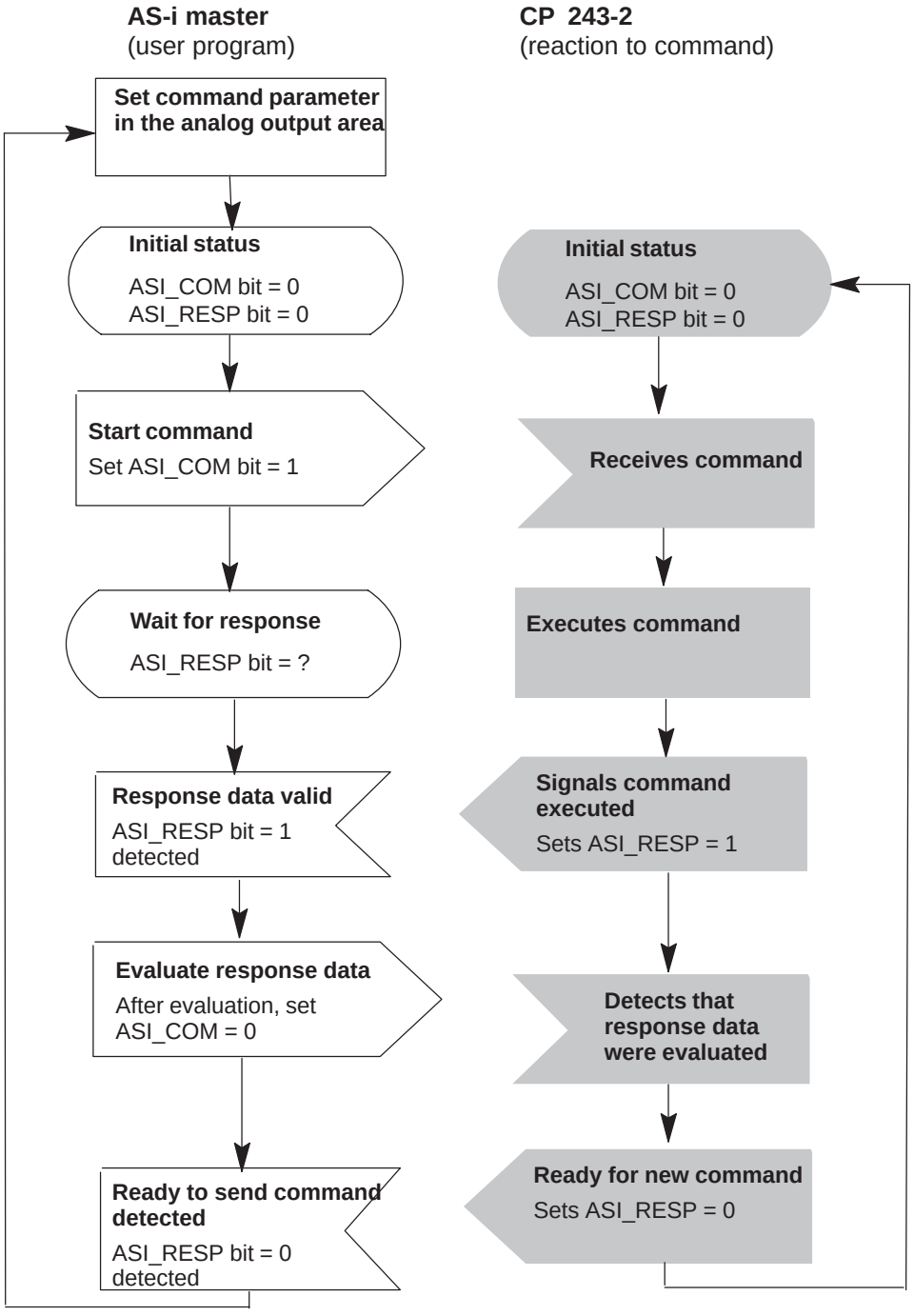


Figure 5-1

A command started by the CP 243-2 is executed completely regardless of the state of the ASI_COM bit.

The ASI_RESP bit is only reset by the CP 243-2 when the user program has set the ASI_COM bit to “0”.

Example

The following example in STL applies to a CPU 222 with a CP 243-2 plugged in directly beside it:

The example shows the sequence of the Read_Lists_and_Flags command. Command execution is triggered by the positive edge at input 0.0.

To simplify matters, 224 bytes are always transferred to the CP 243-2 in these examples. When the response is read in from the CP 243-2, 224 bytes are also transferred. This allows each command to be processed regardless of its length.

Table 5-1

OB1 (STL)	
NETWORK 1	
LD SM0.1	//If: bit “First Scan”:
SI Q1.7, 1	//PLC_RUN = 1
RI Q.0, 6	//select bank 0
LD I1.1	//If: CP_READY
MOVW 16#3000, VW700	//Enter code “Read_extended_lists”
CALL 3	//Then: SBR 3

Table 5-2

SBR 3 (STL)	
NETWORK 1	//Transfer the command data
LD I0.0	//If trigger bit
EU	//pos. edge
AN Q1.6	//ASI_COM
AN I1.6	//ASI_RESP
RI Q1.0, 6	//Select bank 2
SI Q1.1, 1	//Select bank 2
BMW VW700, AQW0, 8	//V memory –> bank
SI Q1.0, 1	//Select bank 3
BMW VW716, AQW0, 8	//V memory –> bank
RI Q1.0, 2	//Select bank 4
SI Q1.2, 1	//Select bank 4
BMW VW732, AQW0, 8	//V memory –> bank

Table 5-2 , continued

```
SI    Q1.0, 1                 //Select bank 5
BMW   VW748, AQW0, 8          //V memory –> bank
RI    Q1.0, 1                 //Select bank 6
SI    Q1.1, 1                 //Select bank 6
BMW   VW764, AQW0, 8          //V memory –> bank
SI    Q1.0, 1                 //Select bank 7
BMW   VW780, AQW0, 8          //V memory –> bank
RI    Q1.0, 3                 //Select bank 8
SI    Q1.3, 1                 //Select bank 8
BMW   VW796, AQW0, 8          //V memory –> bank
SI    Q1.0, 1                 //Select bank 9
BMW   VW812, AQW0, 8          //V memory –> bank
RI    Q1.0, 1                 //Select bank 10
SI    Q1.1, 1                 //Select bank 10
BMW   VW828, AQW0, 8          //V memory –> bank
SI    Q1.0, 1                 //Select bank 11
BMW   VW844, AQW0, 8          //V memory –> bank
RI    Q1.0, 2                 //Select bank 12
SI    Q1.2, 1                 //Select bank 12
BMW   VW860, AQW0, 8          //V memory –> bank
SI    Q1.0, 1                 //Select bank 13
BMW   VW876, AQW0, 8          //V memory –> bank
RI    Q1.0, 1                 //Select bank 14
SI    Q1.1, 1                 //Select bank 14
BMW   VW892, AQW0, 8          //V memory –> bank
SI    Q1.0, 1                 //Select bank 15
BMW   VW908, AQW0, 8          //V memory –> bank
RI     Q1.0,6                 //Select bank 0
SI    Q1.6, 1                 //ASI_COM

//Fetch response from CP
LD    Q1.6                    //ASI_COM
A     I1.6                    //ASI_RESP
RI    Q1.0, 6                 //Select bank 2
SI    Q1.1, 1                 //Select bank 2
BMW   AIW0, VW400, 8          //Bank –> V memory
SI    Q1.0, 1                 //Select bank 3
BMW   AIW0, VW416, 8          //Bank –> V memory
RI    Q1.0, 2                 //Select bank 4
SI    Q1.2, 1                 //Select bank 4
BMW   AIW0, VW432, 8          //Bank –> V memory
SI    Q1.0, 1                 //Select bank 5
BMW   AIW0, VW448, 8          //Bank –> V memory
RI    Q1.0, 1                 //Select bank 6
SI    Q1.1, 1                 //Select bank 6
BMW   AIW0, VW464, 8          //Bank –> V memory
SI    Q1.0, 1                 //Select bank 7
BMW   AIW0, VW480, 8          //Bank –> V memory
RI    Q1.0, 3                 //Select bank 8
SI    Q1.3, 1                 //Select bank 8
BMW   AIW0, VW496, 8          //Bank –> V memory
```

Table 5-2 , continued

```
SI    Q1.0, 1                 //Select bank 9
BMW   AIW0, VW512, 8          //Bank –> V memory
RI    Q1.0, 1                 //Select bank 10
SI    Q1.1, 1                 //Select bank 10
BMW   AIW0, VW528, 8          //Bank –> V memory
SI    Q1.0, 1                 //Select bank 11
BMW   AIW0, VW544, 8          //Bank –> V memory
RI    Q1.0, 2                 //Select bank 12
SI    Q1.2, 1                 //Select bank 12
BMW   AIW0, VW560, 8          //Bank –> V memory
SI    Q1.0, 1                 //Select bank 13
BMW   AIW0, VW576, 8          //Bank –> V memory
RI    Q1.0, 1                 //Select bank 14
SI    Q1.1, 1                 //Select bank 14
BMW   AIW0, VW592, 8          //Bank –> V memory
SI    Q1.0, 1                 //Select bank 15
BMW   AIW0, VW608, 8          //Bank –> V memory
RI    Q1.0, 6                 //Select bank 0
RI    Q1.6, 1                 //ASI_COM
```

5.2 Description of the AS-i Commands

Overview

The following sections describe the AS-i command calls that can be sent by the S7-200 system to the CP 243-2. With these command calls, the CP 243-2 provides the complete functionality of the M1 master profile of the AS-i master specification. In addition to this, the CP 243-2 can be configured completely using command calls by the S7-200 system.

How to use the jobs is explained in the descriptions of the individual jobs, the PICS appendix and the detailed explanations in /1/ and /2/.

The commands that can be executed are listed in the following table:

Table 5-3

Name	Parameter	Return	Coding
Set_Permanent_Parameter –> described in Section 5.2.1	Slave address, parameter		0 0 $_H$
Get_Permanent_Parameter –> described in Section 5.2.2	Slave address	Parameter	0 1 $_H$
Write_Parameter –> described in Section 5.2.3	Slave address, parameter	Parameter echo (optional)	0 2 $_H$
Read_Parameter –> described in Section 5.2.4	Slave address	Parameter value	0 3 $_H$
Store_Actual_Parameters –> described in Section 5.2.5			0 4 $_H$
Set_Extended_Permanent_Configuration –> described in Section 5.2.6	Slave address, configuration		2 5 $_H$
Get_Extended_Permanent_Configuration –> described in Section 5.2.7	Slave address	specified configuration	2 6 $_H$
Store_Actual_Configuration –> described in Section 5.2.8			0 7 $_H$
Get_Extended_Actual_Configuration –> described in Section 5.2.9	AS-i slave address	Actual configuration data	2 8 $_H$
Set_Extended_LPS –> described in Section 5.2.10	LPS		2 9 $_H$
Set_Offline_Mode –> described in Section 5.2.11	Mode		0 A $_H$
Select_Autoprogramming –> described in Section 5.2.12	Mode		0 B $_H$
Set_Operation_Mode –> described in Section 5.2.13	Mode		0 C $_H$
Change_AS-i_Slave_Address –> described in Section 5.2.14	Address 1, Address2		0 D $_H$

Table 5-3 , continued

Name	Parameter	Return	Coding
Get_AS-i_Slave_Status –> described in Section 5.2.15	Slave address	Error record of the AS-i slave	0 F $_H$
Get_LPS, Get_LAS, Get_LDS, Get_Flags –> described in Section 5.2.16		LDS, LAS, LPS, flags	3 0 $_H$
Get_Extended_Total_Configuration –> described in Section 5.2.17		Actual configuration data actual parameters LAS, flags	3 9 $_H$
Store_Extended_Total_Configuration –> described in Section 5.2.18	Total configuration		3 A $_H$
Write_Extended_Parameter_List –> described in Section 5.2.19	Parameter list		3 C $_H$
Read_Extended_Parameter_Echo_List –> described in Section 5.2.20		Parameter echo list	3 3 $_H$
Read_Version_ID –> described in Section 5.2.21		Version string	1 4 $_H$
Read_AS-i_Slave_ID –> described in Section 5.2.22	Slave address	ID code	1 7 $_H$
Read_AS-i_Slave_Extended_ID1 –> described in Section 5.2.23	Slave address	Extended ID1 code	3 7 $_H$
Write_AS-i_Slave_Extended_ID1 –> described in Section 5.2.24	Extended ID1 code		3 F $_H$
Read_AS-i_Slave_Extended_ID2 –> described in Section 5.2.25	Slave address	Extended ID2 code	3 8 $_H$
Read_AS-i_Slave_I/O –> described in Section 5.2.26	Slave address	I/O configuration	1 8 $_H$
Read_I/O_Error_List –> described in Section 5.2.27		LPF	3 E $_H$
Write_AS-i_Slave_Parameter_String –> described in Section 5.2.28	Slave address, parameter string		4 0 $_H$
Read_AS-i_Slave_Parameter_String –> described in Section 5.2.29	Slave address	Parameter string	4 1 $_H$
Read_AS-i_Slave_ID_String –> described in Section 5.2.30	Slave address	ID string	4 2 $_H$
Read_AS-i_Slave_Diagnostic_String –> described in Section 5.2.31	Slave address	Diagnostic string	4 3 $_H$
Read_Data_and_Delta_List –> described in Section 5.2.32	none	Error bits Input data Delta list	1 D $_H$

General Structure of the Command Buffer

Depending on the command, the command buffer can extend over a maximum of 14 banks (bank 2–15 in the analog module) with a maximum of 224 bytes.

In the following description of the command interface, the start address 0 is assumed for the analog input module of the CP to simplify byte numbering.

Table 5-4

Bank	Byte	Meaning / Content
2	0	Command number
	1	Parameters for job
	2	Parameters for job
	3	Parameters for job
	4	Parameters for job
	5	Parameters for job
	6	Parameters for job
	7	Parameters for job
	8	Parameters for job
	9	Parameters for job
	10	Parameters for job
	11	Parameters for job
	12	Parameters for job
	13	Parameters for job
	14	Parameters for job
	15	Parameters for job
.	.	.
.	.	.
.	.	.
15	0	Parameters for job
	:	:
	15	Parameters for job

General Structure of the Response Buffer

Depending on the command, the response buffer can extend over a maximum of 14 banks (bank 2–15 in the analog module) and a maximum of 224 bytes.

In the following description of the command interface, the start address 0 is assumed for the analog output module of the CP to simplify byte numbering.

Table 5-5

Bank	**Byte**	Meaning / Content
2	0	Command number (echo)
	1	Command status
	2	Response data
	3	Response data
	4	Response data
	5	Response data
	6	Response data
	7	Response data
	8	Response data
	9	Response data
	10	Response data
	11	Response data
	12	Response data
	13	Response data
	14	Response data
	15	Response data
.	.	.
.	.	.
.	.	.
15	0	Response data
	:	:
	15	Response data

Command Status

Whether or not the job was executed correctly or errors occurred is signaled in the command status of the response buffer in byte 1.

Table 5-6

Value	Meaning
00_H	Job completed without error
81_H	The AS-i slave address is incorrect
82_H	The AS-i slave is not activated (not in LAS).
83_H	Error on AS-Interface.
84_H	Command not permitted in the current status of the AS-i master.
85_H	An AS-i slave with address 0 exists.
86_H	The AS-i slave has illegal configuration data (I/O or ID codes).
$A1_H$	The addressed AS-i slave was not found on the AS-Interface.
$A2_H$	An AS-i slave with address 0 exists.
$A3_H$	An AS-i slave with the new address already exists on the AS-Interface.
$A4_H$	The AS-i slave address cannot be deleted.
$A5_H$	The AS-i slave address cannot be set.
$A6_H$	The AS-i slave address cannot be stored permanently.
$A7_H$	Error reading the extended ID1 code.
$A8_H$	The target address is not plausible (for example a B slave address was used for a standard slave).
$B1_H$	A length error has occurred transferring a string according to profile 7.4.
$B2_H$	A protocol error has occurred transferring a string according to profile 7.4.
$F8_H$	The job number or the job parameter is unknown.
$F9_H$	The AS-i master has detected an EEPROM error.

General Structure of the AS-i Slave Address

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

Bit 7		Bit 5	Bit 4	Bit 3			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

5.2.1 Set_Permanent_Parameter

Purpose

With this call, a parameter value for the specified AS-i slave is transferred to the CP 243-2 . The value is saved permanently as a configured value.

The configured parameter is **not** transferred immediately to the AS-i slave by the CP 243-2. The configured parameter value is only transferred when the AS-i slave is activated after turning on the power supply on the CP 243-2.

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.

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Command number: 00_H			
2	1	AS-i slave address			
2	2	irrelevant		Parameter	

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: 00_H
2	1	Command status

5.2.2 Get_Permanent_Parameter

Purpose

With this call, a slave-specific parameter value stored on the EEPROM of the CP 243-2 is read.

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning
2	0	Command number: 01_H
2	1	AS-i slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning	
		Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
2	0	Echo of the command number: 01_H	
2	1	Command status	
2	2	irrelevant	Parameter

5.2.3 Write_Parameter

Purpose of the Command

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

The parameter is stored on the CP 243-2 only **temporarily** and is not entered as a configured parameter in the EEPROM!

The AS-i slave transfers its current parameter value in the reply (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 supplied as a parameter echo in the receive buffer.

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

Bank	Byte	Meaning			
		Bit 7	**Bit 4**	**Bit 3**	**Bit 0**
2	0	Command number: 02_H			
2	1	AS-i slave address			
2	2	irrelevant		Parameter	

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning			
		Bit 7	**Bit 4**	**Bit 3**	**Bit 0**
2	0	Echo of the command number: 02_H			
2	1	Command status			
2	2	Parameter echo			

5.2.4 Read_Parameter

Purpose

This call returns the current parameter value (actual parameter) of a slave.

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

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning
2	0	Command number: 03_H
2	1	AS-i slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning	
		Bit 7 Bit 4	Bit 3 Bit 0
2	0	Echo of the command number: 03_H	
2	1	Command status	
2	2	irrelevant	Parameter

5.2.5 Store_Actual_Parameters

Purpose

This call overwrites the permanently stored configured parameters with the actual parameters, in other words the parameters are reconfigured.

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

Bank	Byte	Meaning
2	0	Command number: 04_H

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: 04_H
2	1	Command status

5.2.6 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 CP 243-2 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 executing this command, the AS-i master changes to the offline phase and then changes back to normal operation (restart on the AS-i master). This call is not executed in the protected mode.

Structure of the Job Data in the Send Buffer

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

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning	
		Bit 7 ... Bit 4	**Bit 3 ... Bit 0**
2	0	Echo of the command number: 25_H	
2	1	Command status	

5.2.7 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

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Command number 26_H			
2	1	Slave address			

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Echo of the command number: 26_H			
2	1	Command status			
2	2	ID code		I/O configuration	
2	3	Extended ID1 code		Extended ID2 code	

5.2.8 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.

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning
2	0	Command number: 07_H

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: 07_H
2	1	Command status

5.2.9 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

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Command number 28_H			
2	1	Slave address			

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Echo of the command number: 28_H			
2	1	Command status			
2	2	ID code		I/O configuration	
2	3	Extended ID1 code		Extended ID2 code	

5.2.10 Set_Extended_LPS

Purpose

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

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.

Structure of the Job Data in the Send Buffer

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

In the LPS data, 0 means AS-i slave not configured, 1 means AS-i slave configured.

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: 29_H
2	1	Command status

5.2.11 Set_Offline_Mode

Purpose

This call switches between the online and offline mode.

The **online mode** is the normal situation for the CP 243-2. 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 slaves in the LAS. The addressed 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 CP 243-2 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 warm/hot restart, the CP 243-2 is once again in the online mode.

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning	
		Bit 7 ... Bit 1	Bit 0
2	0	Command number: $0A_H$	
2	1	reserved	Mode (0=online 1=offline)

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: $0A_H$
2	1	Command status

5.2.12 Select_Autoprogramming

Purpose

This call can enable or disable the “automatic address programming” function (see also Section 6.1).

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

Bank	Byte	Meaning	
		Bit 7 ... Bit 1	Bit 0
2	0	Command number: $0B_H$	
2	1	reserved	Value for AUTO_ADDR_ENABLE 1=Automatic address programming enabled 0=Automatic address programming disabled

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: $0B_H$
2	1	Command status

5.2.13 Set_Operation_Mode

Purpose of the Command

With this call, you can select 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 saved **permanently** in the EEPROM, i.e. it is retained following a startup/restart.

When changing from the configuration mode to the protected mode, the CP 243-2 is restarted (transition to the offline phase followed by switchover to the online mode).

Note

If an AS-i slave with the address “0” is connected, the CP 243-2 cannot switch from the configuration mode to the protected mode.

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning
2	0	Command number: $0C_H$
2	1	Operating mode protected mode: 00H configuration mode: 01H

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: $0C_H$
2	1	Command status

5.2.14 Change_AS-i_Slave_Address

Purpose 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, the address is changed from the old slave address (0) to the new slave address.

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

1. A slave with the “old slave address” exists.
2. If the old slave address is not equal to 0, then a 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 “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 Job Data in the Send Buffer

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

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: $0D_H$
2	1	Command status

5.2.15 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** / **“Address/ID code volatile”** This flag is set when the internal AS-i 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. when the AS-i internal slave address comparison recognizes that the stored address is not the same as the entry in the address register.	
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

Bank	Byte	Meaning
2	0	Command number: $0F_H$
2	1	AS-i slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning				
		Bit 7 Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	0	Echo of the command number: $0F_H$				
2	1	Command status				
2	2	reserved	S 3	S 2	S 1	S 0

5.2.16 Get_LPS, Get_LAS, Get_LDS, Get_Flags

Purpose

With this call, the following entries are read out of the AS-i master CP 243-2:

- 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 specification

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning
2	0	Command number: 30_H

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning							
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	0	30H							
2	1	Command status							
2	2	LAS slave 0	LAS slave 1	LAS slave 2	LAS slave 3	LAS slave 4	LAS slave 5	LAS slave 6	LAS slave 7
2	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
2	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
2	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
2	6	reserv.	LAS slave 1B	LAS slave 2B	LAS slave 3B	LAS slave 4B	LAS slave 5B	LAS slave 6B	LAS slave 7B
2	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
2	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
2	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
2	10	LDS slave 0	LDS slave 1	LDS slave 2	LDS slave 3	LDS slave 4	LDS slave 5	LDS slave 6	LDS slave 7

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

Flag 1

Bit Number	Meaning
8	OFFLINE_READY
9	APF
10	NORMAL_MODE
11	CONFIG_MODE
12	AUTO_ADDR_AVAIL
13	AUTO_ADDR_ASSIGN
14	LDS_0
15	CONFIG_OK

Flag 2

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

Meaning of the Flags

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 CP 243-2 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** 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 cable).
LDS_0	This flag is set when a 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 CP is to change to the OFFLINE mode or is already in this mode.
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 master has been turned on. If the master is later changed to OFFLINE, the bit is reset.

meaning of the bits in the lists:

Bit = 0: AS-i slave is **not** activated (detected, configured)

Bit = 1: AS-i slave is activated (detected, configured)

5.2.17 Get_Extended_Total_Configuration

Purpose

With this command, the following data are read from the CP 243-2:

- The list of active slaves (LAS). This indicates which of the connected slaves are activated.
- The current configuration data of the connected slaves (I/O configuration and ID code).
- The current parameters of the 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 CP 242-8 as the expected configuration using the command ‘Store_Extended_Total_Configuration’ (see Section 5.2.18).

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning
2	0	Command number: 39_H

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning							
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	0	39H							
2	1	Command status							
2	2	LAS slave 0	LAS slave 1	LAS slave 2	LAS slave 3	LAS slave 4	LAS slave 5	LAS slave 6	LAS slave 7
2	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
2	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
2	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
2	6	reserv.	LAS slave 1B	LAS slave 2B	LAS slave 3B	LAS slave 4B	LAS slave 5B	LAS slave 6B	LAS slave 7B
2	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

2	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
2	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
2	10	ID_CODE slave 0				I/O configuration slave 0			
2	11	Ext ID1 slave 0				Ext ID2 slave 0			
2	12	ID_CODE slave 1				I/O configuration slave 1			
2	13	Ext ID1 slave 1				Ext ID2 slave 1			
2	14	ID_CODE slave 2				I/O configuration slave 2			
2	15	Ext ID1 slave 2				Ext ID2 slave 2			
3	0	ID_CODE slave 3				I/O configuration slave 3			
3	1	Ext ID1 slave 3				Ext ID2 slave 3			
3	2	ID_CODE slave 4				I/O configuration slave 4			
3	3	Ext ID1 slave 4				Ext ID2 slave 4			
3	4	ID_CODE slave 5				I/O configuration slave 5			
3	5	Ext ID1 slave 5				Ext ID2 slave 5			
3	6	ID_CODE slave 6				I/O configuration slave 6			
3	7	Ext ID1 slave 6				Ext ID2 slave 6			
3	8	ID_CODE slave 7				I/O configuration slave 7			
3	9	Ext ID1 slave 7				Ext ID2 slave 7			
3	10	ID_CODE slave 8				I/O configuration slave 8			
3	11	Ext ID1 slave 8				Ext ID2 slave 8			
3	12	ID_CODE slave 9				I/O configuration slave 9			
3	13	Ext ID1 slave 9				Ext ID2 slave 9			
3	14	ID_CODE slave 10				I/O configuration slave 10			
3	15	Ext ID1 slave 10				Ext ID2 slave 10			
4	0	ID_CODE slave 11				I/O configuration slave 11			
4	1	Ext ID1 slave 11				Ext ID2 slave 11			
4	2	ID_CODE slave 12				I/O configuration slave 12			
4	3	Ext ID1 slave 12				Ext ID2 slave 12			
4	4	ID_CODE slave 13				I/O configuration slave 13			
4	5	Ext ID1 slave 13				Ext ID2 slave 13			
4	6	ID_CODE slave 14				I/O configuration slave 14			
4	7	Ext ID1 slave 14				Ext ID2 slave 14			
4	8	ID_CODE slave 15				I/O configuration slave 15			
4	9	Ext ID1 slave 15				Ext ID2 slave 15			
4	10	ID_CODE slave 16				I/O configuration slave 16			
4	11	Ext ID1 slave 16				Ext ID2 slave 16			
4	12	ID_CODE slave 17				I/O configuration slave 17			
4	13	Ext ID1 slave 17				Ext ID2 slave 17			
4	14	ID_CODE slave 18				I/O configuration slave 18			
4	15	Ext ID1 slave 18				Ext ID2 slave 18			
5	0	ID_CODE slave 19				I/O configuration slave 19			
5	1	Ext ID1 slave 19				Ext ID2 slave 19			
5	2	ID_CODE slave 20				I/O configuration slave 20			
5	3	Ext ID1 slave 20				Ext ID2 slave 20			
5	4	ID_CODE slave 21				I/O configuration slave 21			
5	5	Ext ID1 slave 21				Ext ID2 slave 21			

5	6	ID_CODE slave 22	I/O configuration slave 22
5	7	Ext ID1 slave 22	Ext ID2 slave 22
5	8	ID_CODE slave 23	I/O configuration slave 23
5	9	Ext ID1 slave 23	Ext ID2 slave 23
5	10	ID_CODE slave 24	I/O configuration slave 24
5	11	Ext ID1 slave 24	Ext ID2 slave 24
5	12	ID_CODE slave 25	I/O configuration slave 25
5	13	Ext ID1 slave 25	Ext ID2 slave 25
5	14	ID_CODE slave 26	I/O configuration slave 26
5	15	Ext ID1 slave 26	Ext ID2 slave 26
6	0	ID_CODE slave 27	I/O configuration slave 27
6	1	Ext ID1 slave 27	Ext ID2 slave 27
6	2	ID_CODE slave 28	I/O configuration slave 28
6	3	Ext ID1 slave 28	Ext ID2 slave 28
6	4	ID_CODE slave 29	I/O configuration slave 29
6	5	Ext ID1 slave 29	Ext ID2 slave 29
6	6	ID_CODE slave 30	I/O configuration slave 30
6	7	Ext ID1 slave 30	Ext ID2 slave 30
6	8	ID_CODE slave 31	I/O configuration slave 31
6	9	Ext ID1 slave 31	Ext ID2 slave 31
6	10	reserved	reserved
6	11	reserved	reserved
6	12	ID_CODE slave 1B	I/O configuration slave 1B
6	13	Ext ID1 slave 1B	Ext ID2 slave 1B
6	14	ID_CODE slave 2B	I/O configuration slave 2B
6	15	Ext ID1 slave 2B	Ext ID2 slave 2B
7	0	ID_CODE slave 3B	I/O configuration slave 3B
7	1	Ext ID1 slave 3B	Ext ID2 slave 3B
7	2	ID_CODE slave 4B	I/O configuration slave 4B
7	3	Ext ID1 slave 4B	Ext ID2 slave 4B
7	4	ID_CODE slave 5B	I/O configuration slave 5B
7	5	Ext ID1 slave 5B	Ext ID2 slave 5B
7	6	ID_CODE slave 6B	I/O configuration slave 6B
7	7	Ext ID1 slave 6B	Ext ID2 slave 6B
7	8	ID_CODE slave 7B	I/O configuration slave 7B
7	9	Ext ID1 slave 7B	Ext ID2 slave 7B
7	10	ID_CODE slave 8B	I/O configuration slave 8B
7	11	Ext ID1 slave 8B	Ext ID2 slave 8B
7	12	ID_CODE slave 9B	I/O configuration slave 9B
7	13	Ext ID1 slave 9B	Ext ID2 slave 9B
7	14	ID_CODE slave 10B	I/O configuration slave 10B
7	15	Ext ID1 slave 10B	Ext ID2 slave 10B
8	0	ID_CODE slave 11B	I/O configuration slave 11B
8	1	Ext ID1 slave 11B	Ext ID2 slave 11B
8	2	ID_CODE slave 12B	I/O configuration slave 12B
8	3	Ext ID1 slave 12B	Ext ID2 slave 12B
8	4	ID_CODE slave 13B	I/O configuration slave 13B
8	5	Ext ID1 slave 13B	Ext ID2 slave 13B
8	6	ID_CODE slave 14B	I/O configuration slave 14B
8	7	Ext ID1 slave 14B	Ext ID2 slave 14B

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

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

The meaning of the flags is the same as for the read lists and flags job (see Section 5.2.16).

5.2.18 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 CP 243-2.

The following data are transferred:

- The list of configured slaves specifying the slaves that can be activated by the CP 243-2 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 the AS-i slave parameters stored on the CP 243-2 (non-volatile). These are transferred to the AS-i slaves during the start up of the CP 243-2.
- The flags that determine the mode of the CP 243-2 after startup (in other words after the CP 243-2 has been synchronized).

<F 36>The call is not executed 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.

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning							
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	0	Command number $3A_H$							
2	1	00_H							
2	2	LPS slave 0	LPS slave 1	LPS slave 2	LPS slave 3	LPS slave 4	LPS slave 5	LPS slave 6	LPS slave 7
2	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
2	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
2	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
2	6	reserv.	LPS slave 1B	LPS slave 2B	LPS slave 3B	LPS slave 4B	LPS slave 5B	LPS slave 6B	LPS slave 7B
2	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
2	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
2	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

2	10	ID_CODE slave 0	I/O configuration slave 0
2	11	Ext ID1 Slave 0	Ext ID2 slave 0
2	12	ID_CODE slave 1	I/O configuration slave 1
2	13	Ext ID1 Slave 1	Ext ID2 slave 1
2	14	ID_CODE slave 2	I/O configuration slave 2
2	15	Ext ID1 Slave 2	Ext ID2 slave 2
3	0	ID_CODE slave 3	I/O configuration slave 3
3	1	Ext ID1 Slave 3	Ext ID2 slave 3
3	2	ID_CODE slave 4	I/O configuration slave 4
3	3	Ext ID1 Slave 4	Ext ID2 slave 4
3	4	ID_CODE slave 5	I/O configuration slave 5
3	5	Ext ID1 Slave 5	Ext ID2 slave 5
3	6	ID_CODE slave 6	I/O configuration slave 6
3	7	Ext ID1 Slave 6	Ext ID2 slave 6
3	8	ID_CODE slave 7	I/O configuration slave 7
3	9	Ext ID1 Slave 7	Ext ID2 slave 7
3	10	ID_CODE slave 8	I/O configuration slave 8
3	11	Ext ID1 Slave 8	Ext ID2 slave 8
3	12	ID_CODE slave 9	I/O configuration slave 9
3	13	Ext ID1 Slave 9	Ext ID2 slave 9
3	14	ID_CODE slave 10	I/O configuration slave 10
3	15	Ext ID1 Slave 10	Ext ID2 slave 10
4	0	ID_CODE slave 11	I/O configuration slave 11
4	1	Ext ID1 Slave 11	Ext ID2 slave 11
4	2	ID_CODE slave 12	I/O configuration slave 12
4	3	Ext ID1 Slave 12	Ext ID2 slave 12
4	4	ID_CODE slave 13	I/O configuration slave 13
4	5	Ext ID1 Slave 13	Ext ID2 slave 13
4	6	ID_CODE slave 14	I/O configuration slave 14
4	7	Ext ID1 Slave 14	Ext ID2 slave 14
4	8	ID_CODE slave 15	I/O configuration slave 15
4	9	Ext ID1 Slave 15	Ext ID2 slave 15
4	10	ID_CODE slave 16	I/O configuration slave 16
4	11	Ext ID1 Slave 16	Ext ID2 slave 16
4	12	ID_CODE slave 17	I/O configuration slave 17
4	13	Ext ID1 Slave 17	Ext ID2 slave 17
4	14	ID_CODE slave 18	I/O configuration slave 18
4	15	Ext ID1 Slave 18	Ext ID2 slave 18
5	0	ID_CODE slave 19	I/O configuration slave 19
5	1	Ext ID1 Slave 19	Ext ID2 slave 19
5	2	ID_CODE slave 20	I/O configuration slave 20
5	3	Ext ID1 Slave 20	Ext ID2 slave 20
5	4	ID_CODE slave 21	I/O configuration slave 21
5	5	Ext ID1 Slave 21	Ext ID2 slave 21
5	6	ID_CODE slave 22	I/O configuration slave 22
5	7	Ext ID1 Slave 22	Ext ID2 slave 22
5	8	ID_CODE slave 23	I/O configuration slave 23
5	9	Ext ID1 Slave 23	Ext ID2 slave 23
5	10	ID_CODE slave 24	I/O configuration slave 24
5	11	Ext ID1 Slave 24	Ext ID2 slave 24

5	12	ID_CODE slave 25	I/O configuration slave 25
5	13	Ext ID1 Slave 25	Ext ID2 slave 25
5	14	ID_CODE slave 26	I/O configuration slave 26
5	15	Ext ID1 Slave 26	Ext ID2 slave 26
6	0	ID_CODE slave 27	I/O configuration slave 3
6	1	Ext ID1 Slave 27	Ext ID2 slave 3
6	2	ID_CODE slave 28	I/O configuration slave 4
6	3	Ext ID1 Slave 28	Ext ID2 slave 4
6	4	ID_CODE slave 29	I/O configuration slave 5
6	5	Ext ID1 Slave 29	Ext ID2 slave 5
6	6	ID_CODE slave 30	I/O configuration slave 6
6	7	Ext ID1 Slave 30	Ext ID2 slave 6
6	8	ID_CODE slave 31	I/O configuration slave 7
6	9	Ext ID1 Slave 31	Ext ID2 slave 7
6	10	reserved	reserved
6	11	reserved	reserved
6	12	ID_CODE slave 1B	I/O configuration slave 1B
6	13	Ext ID1 Slave 1B	Ext ID2 slave 1B
6	14	ID_CODE slave 2B	I/O configuration slave 2B
6	15	Ext ID1 Slave 2B	Ext ID2 slave 2B
7	0	ID_CODE slave 3B	I/O configuration slave 3B
7	1	Ext ID1 Slave 3B	Ext ID2 slave 3B
7	2	ID_CODE slave 4B	I/O configuration slave 4B
7	3	Ext ID1 Slave 4B	Ext ID2 slave 4B
7	4	ID_CODE slave 5B	I/O configuration slave 5B
7	5	Ext ID1 Slave 5B	Ext ID2 slave 5B
7	6	ID_CODE slave 6B	I/O configuration slave 6B
7	7	Ext ID1 Slave 6B	Ext ID2 slave 6B
7	8	ID_CODE slave 7B	I/O configuration slave 7B
7	9	Ext ID1 Slave 7B	Ext ID2 slave 7B
7	10	ID_CODE slave 8B	I/O configuration slave 8B
7	11	Ext ID1 Slave 8B	Ext ID2 slave 8B
7	12	ID_CODE slave 9B	I/O configuration slave 9B
7	13	Ext ID1 Slave 9B	Ext ID2 slave 9B
7	14	ID_CODE slave 10B	I/O configuration slave 10B
7	15	Ext ID1 Slave 10B	Ext ID2 slave 10B
8	0	ID_CODE slave 11B	I/O configuration slave 11B
8	1	Ext ID1 Slave 11B	Ext ID2 slave 11B
8	2	ID_CODE slave 12B	I/O configuration slave 12B
8	3	Ext ID1 Slave 12B	Ext ID2 slave 12B
8	4	ID_CODE slave 13B	I/O configuration slave 13B
8	5	Ext ID1 Slave 13B	Ext ID2 slave 13B
8	6	ID_CODE slave 14B	I/O configuration slave 14B
8	7	Ext ID1 Slave 14B	Ext ID2 slave 14B
8	8	ID_CODE slave 15B	I/O configuration slave 15B
8	9	Ext ID1 Slave 15B	Ext ID2 slave 15B
8	10	ID_CODE slave 16B	I/O configuration slave 16B
8	11	Ext ID1 Slave 16B	Ext ID2 slave 16B
8	12	ID_CODE slave 17B	I/O configuration slave 17B
8	13	Ext ID1 Slave 17B	Ext ID2 slave 17B

8	14	ID_CODE slave 18B	I/O configuration slave 18B
8	15	Ext ID1 Slave 18B	Ext ID2 slave 18B
9	0	ID_CODE slave 19B	I/O configuration slave 19B
9	1	Ext ID1 Slave 19B	Ext ID2 slave 19B
9	2	ID_CODE slave 20B	I/O configuration slave 20B
9	3	Ext ID1 Slave 20B	Ext ID2 slave 20B
9	4	ID_CODE slave 21B	I/O configuration slave 21B
9	5	Ext ID1 Slave 21B	Ext ID2 slave 21B
9	6	ID_CODE slave 22B	I/O configuration slave 22B
9	7	Ext ID1 Slave 22B	Ext ID2 slave 22B
9	8	ID_CODE slave 23B	I/O configuration slave 23B
9	9	Ext ID1 Slave 23B	Ext ID2 slave 23B
9	10	ID_CODE slave 24B	I/O configuration slave 24B
9	11	Ext ID1 Slave 24B	Ext ID2 slave 24B
9	12	ID_CODE slave 25B	I/O configuration slave 25B
9	13	Ext ID1 Slave 25B	Ext ID2 slave 25B
9	14	ID_CODE slave 26B	I/O configuration slave 26B
9	15	Ext ID1 Slave 26B	Ext ID2 slave 26B
10	0	ID_CODE slave 27B	I/O configuration slave 27B
10	1	Ext ID1 Slave 27B	Ext ID2 slave 27B
10	2	ID_CODE slave 28B	I/O configuration slave 28B
10	3	Ext ID1 Slave 28B	Ext ID2 slave 28B
10	4	ID_CODE slave 29B	I/O configuration slave 29B
10	5	Ext ID1 Slave 29B	Ext ID2 slave 29B
10	6	ID_CODE slave 30B	I/O configuration slave 30B
10	7	Ext ID1 Slave 30B	Ext ID2 slave 30B
10	8	ID_CODE slave 31B	I/O configuration slave 31B
10	9	Ext ID1 Slave 31B	Ext ID2 slave 31B
10	10	irrelevant	Parameter slave 1
10	11	Parameter slave 2	Parameter slave 3
10	12	Parameter slave 4	Parameter slave 5
10	13	Parameter slave 6	Parameter slave 7
10	14	Parameter slave 8	Parameter slave 9
10	15	Parameter slave 10	Parameter slave 11
11	0	Parameter slave 12	Parameter slave 13
11	1	Parameter slave 14	Parameter slave 15
11	2	Parameter slave 16	Parameter slave 17
11	3	Parameter slave 18	Parameter slave 19
11	4	Parameter slave 20	Parameter slave 21
11	5	Parameter slave 22	Parameter slave 23
11	6	Parameter slave 24	Parameter slave 25
11	7	Parameter slave 26	Parameter slave 27
11	8	Parameter slave 28	Parameter slave 29
11	9	Parameter slave 30	Parameter slave 31
11	10	irrelevant	Parameter slave 1B
11	11	Parameter slave 2B	Parameter slave 3B
11	12	Parameter slave 4B	Parameter slave 5B
11	13	Parameter slave 6B	Parameter slave 7B
11	14	Parameter slave 8B	Parameter slave 9B
11	15	Parameter slave 10B	Parameter slave 11B

12	0	Parameter slave 12B	Parameter slave 13B
12	1	Parameter slave 14B	Parameter slave 15B
12	2	Parameter slave 16B	Parameter slave 17B
12	3	Parameter slave 18B	Parameter slave 19B
12	4	Parameter slave 20B	Parameter slave 21B
12	5	Parameter slave 22B	Parameter slave 23B
12	6	Parameter slave 24B	Parameter slave 25B
12	7	Parameter slave 26B	Parameter slave 27B
12	8	Parameter slave 28B	Parameter slave 29B
12	9	Parameter slave 30B	Parameter slave 31B
12	10	Flag 1	
12	11	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 on a gray background.

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.

Only the gray shaded flags can be modified.

CONFIG_MODE	The entry ‘0’ means that the CP 243-2 changes to the protected mode after executing the command. The entry ‘1’ means that the CP continues in the configuration mode.	
	0	The AS-i master starts up in the protected mode on completion of the job.
	1	The AS-i master starts up in the configuration mode on completion of the job.
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.

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: $3A_H$
2	1	Command status

5.2.19 Write_Extended_Parameter_List

Purpose

With this command, the parameters for all slaves are transferred to the CP 243-2. The CP 243-2 transfers **only** the parameters **that have changed, in other words that deviate from the current actual parameters** to the AS-i slaves.

Structure of the Job Data in the Send Buffer

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

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
1	1	Echo of the command number: $3C_H$
2	2	Command status

5.2.20 Read_Extended_Parameter_Echo_List

Purpose

When the parameters are transferred to the AS-i slaves, they return “echo values” as the response. The read parameter echo list call reads out the echo values of all AS-i slaves.

Structure of the Job Data in the Send Buffer

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

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning							
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	0	Echo of the command number 33_H							
2	1	Command status							
2	2	irrelevant				Par echo slave 1			
2	3	Par echo slave 2				Par echo slave 3			
2	4	Par echo slave 4				Par echo slave 5			
2	5	Par echo slave 6				Parameters slave 7			
2	6	Par echo slave 8				Par echo slave 9			
2	7	Par echo slave 10				Par echo slave 11			
2	8	Par echo slave 12				Par echo slave 13			
2	9	Par echo slave 14				Par echo slave 15			
2	10	Par echo slave 16				Par echo slave 17			
2	11	Par echo slave 18				Par echo slave 19			
2	12	Par echo slave 20				Par echo slave 21			
2	13	Par echo slave 22				Par echo slave 23			
2	14	Par echo slave 24				Par echo slave 25			
2	15	Par echo slave 26				Par echo slave 27			
2	0	Par echo slave 28				Par echo slave 29			
3	1	Par echo slave 30				Par echo slave 31			
3	2	irrelevant				Par echo slave 1B			
3	3	Par echo slave 2B				Par echo slave 3B			
3	4	Par echo slave 4B				Par echo slave 5B			
3	5	Par echo slave 6B				Parameters slave 7B			
3	6	Par echo slave 8B				Par echo slave 9B			
3	7	Par echo slave 10B				Par echo slave 11B			
3	8	Par echo slave 12B				Par echo slave 13B			

3	9	Par echo slave 14B	Parameters slave 15B
3	10	Par echo slave 16B	Par echo slave 17B
3	11	Par echo slave 18B	Par echo slave 19B
3	12	Par echo slave 20B	Par echo slave 21B
3	13	Par echo slave 22B	Parameters slave 23B
3	14	Par echo slave 24B	Par echo slave 25B
3	15	Par echo slave 26B	Par echo slave 27B
4	0	Par echo slave 28B	Par echo slave 29B
4	1	Par echo slave 30B	Parameters slave 31B

5.2.21 Read_Version_ID

Purpose

With this call, the version ID of the CP 243-2 firmware is read out.

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning
2	0	Command number: 14_H

The reply of the CP 243-2 contains the name and the firmware version number of the CP 243-2 in the form shown below:

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number 14_H
2	1	Command status
2	2	C
2	3	P
2	4	
2	5	2
2	6	4
2	7	3
2	8	–
2	9	2
2	10	
2	11	V
2	12	x
2	13	.
2	14	y
2	15	y

“x.yy” stands for the current version number of the firmware of the CP 243-2.

5.2.22 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

Bank	Byte	Meaning
2	0	Command number: 17_H
2	1	AS-i slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning	
		Bit 7 Bit 4	Bit 3 Bit 0
2	0	Echo of the command number: 17_H	
2	1	Command status	
2	2	reserved	ID code

5.2.23 Read_AS-i_Slave_ID1

Purpose

With this call, the 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

Bank	Byte	Meaning
2	0	Command number: 37_H
2	1	AS-i slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Echo of the command number: 37_H			
2	1	Command status			
2	2	reserved		Extended ID1 code	

5.2.24 Write_AS-i_Slave_Extended_ID1

Purpose

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

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Command number: $3F_H$			
2	1	irrelevant		Extended ID1 code	

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Echo of the command number: $3F_H$			
2	1	Command status			

5.2.25 Read_AS-i_Slave_ID2

Purpose

With this call, the 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

Bank	Byte	Meaning
2	0	Command number: 38_H
2	1	AS-i slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning			
		Bit 7	Bit 4	Bit 3	Bit 0
2	0	Echo of the command number: 38_H			
2	1	Command status			
2	2	reserved		Slave ID2	

5.2.26 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

Bank	Byte	Meaning
2	0	Command number: 18_H
2	1	AS-i slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning	
		Bit 7 ... Bit 4	Bit 3 ... Bit 0
2	0	Echo of the command number: 18_H	
2	1	Command status	
2	2	reserved	I/O configuration

5.2.27 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

Bank	Byte	Meaning
2	0	Command number $3E_H$
2	1	AS-i slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning							
		Bit 7	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
2	0	Echo of the command number $3E_H$							
2	1	Command status							
2	2	slave 0	slave 1	slave 2	slave 3	slave 4	slave 5	slave 6	slave 7
2	3	slave 8	slave 9	slave 10	slave 11	slave 12	slave 13	slave 14	slave 15
2	4	slave 16	slave 17	slave 18	slave 19	slave 20	slave 21	slave 22	slave 23
2	5	slave 24	slave 25	slave 26	slave 27	slave 28	slave 29	slave 30	slave 31
2	6	reserv.	slave 1B	slave 2B	slave 3B	slave 4B	slave 5B	slave 6B	slave 7B
2	7	slave 8B	slave 9B	slave 10B	slave 11B	slave 12B	slave 13B	slave 14B	slave 15B
2	8	slave 16B	slave 17B	slave 18B	slave 19B	slave 20B	slave 21B	slave 22B	slave 23B
2	9	slave 2B4	slave 25B	slave 26B	slave 27B	slave 28B	slave 29B	slave 30B	slave 31B

The bits in the LPF data have the following meaning:

Bit=0: Slave signals no peripheral fault

Bit=1: Slave signals peripheral faults

5.2.28 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 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

Bank	Byte	Meaning
2	0	40_H
2	1	Slave address
2	2	Number of parameter bytes
2	3	String byte (1)
2	4	String byte (2)
...	...	.....
...	...	String byte (n–1)
...	...	String byte (n)

Maximum value for n=220

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number: 40_H
2	1	Command status

5.2.29 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 223 bytes of reply data. The actual number of parameter bytes sent by the AS-i slave is signaled by the AS-i master in byte 2 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

Bank	**Byte**	**Meaning**
2	0	Command number 41_H
2	1	Slave address

Structure of the Job Data in the Receive Buffer

Bank	**Byte**	**Meaning**
2	0	Echo of the command number 41_H
2	1	Command status
2	2	Number of parameter bytes
2	3	String byte (1)
2	4	String byte (2)
...	...	.....
...	...	String byte (n–1)
...	...	String byte (n)

Maximum value for n=220

5.2.30 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 always supplies 223 bytes of reply data. The actual number of ID bytes sent by the AS-i slave is signaled by the AS-i master in byte 2 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

In contrast to other jobs, in this job, the bytes containing the bits ”Follow” and ”Valid” are also transferred (see slave profile 7.4).

Structure of the Job Data in the Send Buffer

Bank	Byte	Meaning
2	0	Command number 42_H
2	1	Slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number 42_H
2	1	Command status
2	2	Number of ID bytes
2	3	String byte (1)
2	4	String byte (2)
...	...	.....
...	...	String byte (n–1)
...	...	String byte (n)

Maximum value for n=220

5.2.31 Read_AS-i_Slave_Diagnostic_String

Purpose

With this call, an diagnostic 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 223 bytes of reply data. The number of diagnostic bytes actually sent by the AS-i slave is signaled by the AS-i master in byte 2 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

Bank	Byte	Meaning
2	0	Command number 43_H
2	1	Slave address

Structure of the Job Data in the Receive Buffer

Bank	Byte	Meaning
2	0	Echo of the command number 43_H
2	1	Command status
2	2	Number of diagnostic bytes
2	3	String byte (1)
2	4	String byte (2)
...	...	.....
...	...	String byte (n–1)
...	...	String byte (n)

Maximum value for n=220

5.2.32 Read_Data_and_Delta_List

Purpose

With this call, the AS-i error bits, the input data of the AS-i slaves and the delta list can be read out consistently.

Structure of the Command Buffer

Bank	Byte	Meaning
2	0	Command number: $3D_H$

Structure of the Response Buffer

Bank	Byte	Meaning							
		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
2	0	Echo of the command number $3D_H$							
2	1	Command status							
2	2	APF	CER	0	0	Data slave 1			
2	3	Data slave 2				Data slave 3			
2	4	Data slave 4				Data slave 5			
2	5	Data slave 6				Data slave 7			
2	6	Data slave 8				Data slave 9			
2	7	Data slave 10				Data slave 11			
2	8	Data slave 12				Data slave 13			
2	9	Data slave 14				Data slave 15			
2	10	Data slave 16				Data slave 17			
2	11	Data slave 18				Data slave 19			
2	12	Data slave 20				Data slave 21			
2	13	Data slave 22				Data slave 13			
2	14	Data slave 24				Data slave 25			
2	15	Data slave 26				Data slave 27			
3	0	Data slave 28				Data slave 29			
3	1	Data slave 30				Data slave 31			
3	2	reserved				Data slave 1B			
3	3	Data slave 2B				Data slave 3B			
3	4	Data slave 4B				Data slave 5B			
3	5	Data slave 6B				Data slave 7B			
3	6	Data slave 8B				Data slave 9B			
3	7	Data slave 10B				Data slave 11B			
3	8	Data slave 12B				Data slave 13B			
3	9	Data slave 14B				Data slave15B			
3	10	Data slave 16B				Data slave17B			
3	11	Data slave 18B				Data slave 19B			

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

The meaning of the error bits APF and CER is the same as in the error register.

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6 Dealing with Problems / Error Displays

This chapter contains information about special operating states and explains how to deal with errors.

6.1 Replacing a Defective AS-Interface Slave/Automatic Address Programming

Simple Replacement of AS-Interface Slaves

Using the automatic address programming function, you can replace failed AS-Interface slaves extremely simply.

Note

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

– The CP 243-2 is in the protected mode.

– The AUTO_ADDR_ENABLE flag is set to 1.

and

– Only one AS-Interface slave has failed.

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

Detecting Defective AS-Interface Slaves

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 CP 243-2 is possible.

You can recognize the failed AS-Interface slave simply because the LED assigned to the slave flashes on the front panel. To do this, you must switch the CP 243-2 to the slave display (see Section 1.8.2)

You can now replace the defective slave as follows:

Replace the defective slave with an identical slave (same I/O configuration and ID code extended ID1 code, extended ID2 code) with the address 0 (as supplied).

The CP 243-2 then programs this slave with the address of the original station that had failed.

The “AUP” indicator then goes off. The CP 243-2 indicates the new slave in the LED display.

6.2 Error Displays of the CP 243-2 / Remedying Errors

<F 1>The following table lists the possible causes of errors that can occur when operating the CP 243-2 and how to remedy the problem.

Table 6-1 Error Displays of the CP 243-2 / Remedying Errors

Error	Possible Cause	Remedy
APF LED lit	The AS-Interface power supply unit is not connected or is defective.	Check the connection of the AS-Interface power supply unit; if necessary replace the power supply unit.
	Power requirements of the AS-Interface slaves are too high. Result: The voltage on the AS-Interface cable is too low.	Check the power requirements of the AS-Interface slaves. If necessary, supply the slaves with power externally.
	Short-circuit on the AS-Interface cable.	Check the AS-Interface cable and the attached slaves.
SF lights up without pressing the SET button.	The CP 243-2 is defective. Internal EEPROM error.	Replace the CP 243-2.
SF is lit when the SET button is pressed.	An AS-Interface slave with address 0 exists when there is a change to the protected mode.	Remove the slave with address 0 from the AS-Interface cable.
CER is lit permanently.	The CP 243-2 has not yet been configured.	Configure the CP 243-2 using the mode button on the front panel.
	A configured AS-Interface slave has failed (evaluate the slave display).	Replace the defective AS-Interface slave or configure the CP 243-2 again if the slave is not required.
	An unconfigured AS-Interface slave was connected to the AS-Interface cable.	Remove the AS-Interface slave or reconfigure the CP 243-2 .
	An AS-Interface slave was connected whose configuration data (I/O configuration, ID codes) do not match the values of the configured AS-Interface slave.	Check whether the wrong AS-Interface slave has been connected. If necessary, reconfigure the CP 243-2.
CER display flickers, in other words a configured AS-Interface slave is lost sporadically.	Bad electrical connection.	Check the electrical connections of the AS-Interface slaves.
	Noise affecting the AS-Interface cable.	Check the correct grounding of the S7-200 and check the AS-Interface cable. Check that the shield of the AS-Interface power supply unit is connected correctly.

Table 6-1 Error Displays of the CP 243-2 / Remedying Errors

Error	Possible Cause	Remedy
The CP 243-2 does not switch from the configuration mode to the protected mode.	The S7-200 CPU is in the “RUN” mode.	Switch the S7-200 CPU to “STOP”. This sets the PLC_RUN bit to 0.
	The SET button was not pressed long enough.	Press the button for at least 0.5 seconds.
	A slave with address “0” is connected to the AS-Interface cable. The CP 243-2 cannot change to the protected mode as long as this slave exists.	Remove the slave with address 0.
The CP 243-2 does not switch from the protected mode to the configuration mode.	The S7-200 CPU is in the “RUN” mode.	Switch the S7-200 CPU to “STOP”. This sets the PLC_RUN bit to ‘0’.
	Button not pressed long enough	Press the button for at least 0.5 seconds.
After failure of an AS-Interface slave, the “AUP” display remains off.	The CP 243-2 is in the configuration mode.	“Automatic programming” is not possible in the configuration mode. Program the address of the new AS-Interface slave with the addressing unit.
	More than one AS-Interface slave has failed.	Check the AS-Interface cable. If “APF” is displayed at the same time, check the power supply on the AS-Interface cable. If more than one AS-Interface slave is defective, program the address on the replaced AS-Interface slaves using the addressing unit.
	The CP 243-2 has not detected configured AS-Interface slaves.	Remove the unconfigured AS-Interface slaves from the AS-Interface cable.
	The AUTO_ADDR_ENABLE flag is not set.	Set the bit with the appropriate commands or by pressing the SET button during AS-i Power Fail.

Table 6-1 Error Displays of the CP 243-2 / Remedying Errors

Error	Possible Cause	Remedy
Automatic address programming is unsuccessful although the “AUP” display is lit.	The configuration data (I/O configuration, ID codes) of the replaced AS-Interface slave do not match the values of the original AS-Interface 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 AS-Interface slave with a different type, assign the address with the addressing unit and reconfigure the CP 243-2 (for example by pressing the SET button).
	The replaced AS-Interface slave does not have the address “0”.0	Set the address of the replaced AS-Interface slave with the addressing unit.
	Replaced AS-Interface slave is not correctly connected or is defective.	Check the connections of the AS-Interface slave and if necessary replace the AS-Interface slave.
The “CER” LED and the LEDs of active AS-Interface slaves flicker irregularly.	An extender is installed in the AS-Interface with “Line1” and “Line2” connections reversed.	Correct the connections to the extender.

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AS-Interface Protocol Implementation Conformance Statement (PICS)

A

PICS for the CP 243-2

Table A-1

Vendor	SIEMENS AG
Product Name	CP 243-2 – AS-Interface Master
Order Number	6GK7243-2AX00-0XA0
Version	1
Master Profile	M1e
Date	31.01.2000

List of Master Functions Available

Table A-2

No.	Function or Call on the Host Interface (symbolic representation)	M1	Comment / Function implemented by / Section
1	Image, Status = Read_IDI()	X	By access to the I/O data of the CP 243-2 module by the DP master.
2	Status = Write_ODI(Image)	X	By access to the I/O data of the CP 243-2 module by the DP master.
3	Status = Set_Permanent_Parameter(Addr, Param)	X	see Section 5.2.1
4	Param, Status = Get_Permanent_Parameter(Addr)	X	see Section 5.2.2
5	Status, GParam = Write_Parameter(Addr, Param)	X	see Section 5.2.3
6	Status, Param = Read_Parameter(Addr)	X	see Section 5.2.4
7	Status = Store_Actual_Parameters()	X	see Section 5.2.5
8	Status = Set_Permanent_Configuration(Addr, Config)	X	Set_Extended_Permanent_Configuration / see Section 5.2.6
9	Status, Config = Get_Permanent_Configuration(Addr)	X	Get_Extended_Permanent_Configuration / see Section 5.2.7

Table A-2 , continued

No.	Function or Call on the Host Interface (symbolic representation)	M1	Comment / Function implemented by / Section
10	Status = Store_Actual_Configuration()	X	By pressing the SET button; or with the command Store_actual_configuration see Section 5.2.4
11	Status, Config = Read_Actual_Configuration(Addr)	X	Get_Extended_Actual_Configuration / see Section 5.2.9
12	Status = Set_LPS(List31)	X	Set_LPS / see Section 5.2.10
13	Status, List31 = Get_LPS()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
14	Status, List31 = Get_LAS()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
15	Status, List32 = Get_LDS()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.0	Status = Get_Flags()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.1	Status, Flag = Get_Flag_Config_OK()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.2	Status, Flag = Get_Flag_LDS.0()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.3	Status, Flag = Get_Flag_Auto_Address_Assign()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.4	Status, Flag = Get_Flag_Auto_Prog_Available()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.5	Status, Flag = Get_Flag_Configuration_Active()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.6	Status, Flag = Get_Flag_Normal_Operation_Active()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.7	Status, Flag = Get_Flag_APF()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
16.8	Status, Flag = Get_Flag_Offline_Ready()	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
17	Status = Set_Operation_Mode(Mode)	X	By pressing the SET button; or with the command Set_operation_mode see Section 5.2.13
18	Status = Set_Offline_Mode(Mode)	X	see Section 5.2.11
19	Status = Activate_Data_Exchange(Mode)	–	not implemented

Table A-2 , continued

No.	Function or Call on the Host Interface (symbolic representation)	M1	Comment / Function implemented by / Section
20	Status = Change_Slave_Address(Addr1, Addr2)	X	see Section 5.2.14
21	Status = Set_Auto_Address_Enable	X	see Section5.2.12
22	Status = Get_Auto_Address_Enable	X	Get_LPS, Get_LAS, Get_LDS, Get_Flags / see Section 5.2.16
23.1	Status, Resp = Cmd_Reset_ASI_Slave(Addr, RESET)	–	not implemented
23.2	Status, Resp = Cmd_Read_IO_Configuration(Addr, CONF)	X	Read_AS-i_Slave_I/O / see Section 5.2.26
23.3	Status, Resp = Cmd_Read_Identification_Code(Addr, IDCOD)	X	Read_AS-i_Slave_ID / see Section 5.2.22
23.4	Status, Resp = Cmd_Read_Status(Addr, STAT)	X	see Section 5.2.15
23.5	Status, Resp = Cmd_Read_Reset_Status(Addr, STATRES)	X	see Section 5.2.22

Symbols in column 3 (M2)

Symbol	Meaning
X	Function exists
–	Function does not exist

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

The following formula is used to calculate the AS-Interface cycle time depending on the number of activated slaves.

T_{cycl} = (1 + number of activated slaves) * 156µs

If a pair of slaves using the extended addressing mode (A/B slaves) occupies an address, this pair is counted as a single slave in the formula. Pairs of A and B slaves are addressed in every second AS-Interface cycle; in other words, the calculated cycle time is doubled for these slaves.

The calculated cycle time applies assuming that no frames are repeated, there are no management calls and all slaves are synchronized.

❑

References

B

/1/

AS-Interface:The Actuator-Sensor-Interface for 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.
Geschäftsführung: Dr. Otto W. Madelung
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(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/

SIMATIC S7-200
Programmable Controller / System Manual
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Profibus & AS-Interface
Components on the Field Bus
Catalog ST PI

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

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SIMATIC
STEP 7-Micro/DOS
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.

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Notes on the CE Mark

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Product Name

CP 243-2 Order no.: 6GK7243-2AX00-0XA0

EU Directive EMC 89/336/EEC

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

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

Siemens Aktiengesellschaft
Bereich Automatisierungstechnik
Industrielle Kommunikation (A&D PT2)
Postfach 4848
D-90327 Nuremberg, Germany

Area of Application

The product meets the following requirements:

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

Installation Instructions

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

– This manual
– SIMATIC S7-200 Programmable Controller / System Manual /4/

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.

SIMATIC NET – Support and Training

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SIMATIC Training Center

To help you to become familiar with the SIMATIC S7 automation system, we offer a range of courses. Please contact your regional training center or the central training center in D 90327 Nuremberg, Germany. Infoline: Tel. 0180 523 5611 (48 Pfg./min), Fax. 0180 523 5612

Internet: `http://www.ad.siemens.de/training`

E-mail: AD-Training@nbgm.siemens.de

SIMATIC Customer Support Hotline

Open round the clock, worldwide:

SIMATIC Basic Hotline

Nuremberg
SIMATIC BASIC Hotline
Local time: Mo.-Fr. 8:00 to 18:00
Phone: +49 (911) 895-7000
Fax: +49 (911) 895-7002
E-mail: simatic.support@nbgm.siemens.de

Johnson City
SIMATIC BASIC Hotline
Local time: Mo.-Fr. 8:00 to 17:00
Phone: +1 423 461-2522
Fax: +1 423 461-2231
E-mail: simatic.hotline@sea.siemens.com

Singapore
SIMATIC BASIC Hotline
Local time: Mo.-Fr. 8:30 to 17:30
Phone: +65 740-7000
Fax: +65 740-7001
E-mail: simatic.hotline@sae.siemens.com.sg

SIMATIC Premium Hotline

(Calls charged, only with SIMATIC Card)

Time: Mo.-Fr. 0:00 to 24:00

Phone: +49 (911) 895-7777

Fax: +49 (911) 895-7001

SIMATIC Customer Support Online Services

The SIMATIC customer support team provides you with comprehensive additional information on SIMATIC products in its online services:

- You can obtain general current information:
  - On the Internet at `http://www.ad.siemens.de/net`
  - Using fax polling no. 08765 - 93 02 77 95 00
- Current Product Information leaflets and downloads which you may find useful for your product are available:
  - On the Internet at `http://www.ad.siemens.de/csi/net`
  - Via the Bulletin Board System (BBS) in Nuremberg (*SIMATIC Customer Support Mailbox)* under the number +49 (911) 895-7100.

    To access the mailbox, use a modem with V.34 (28.8 Kbps) capability with the following settings: 8, N, 1, ANSI, or dial in using ISDN (x.75, 64 Kbps).

Further Support

If you have further questions on SIMATIC NET products, please contact your Siemens representative in your local Siemens office.

The addresses are listed:

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

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Glossary

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 an 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.

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.

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