

SINEC

SINEC S1 Master Module CP 2430

C79000-G8976-C062

Release 01
Volume 1 of 1

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SINEC

SINEC S1 Master Module CP 2430

Manual

C79000-B8976-C085

Note

We would point out that the contents of this product documentation shall not become a part of or modify any prior or existing agreement, commitment or legal relationship. The Purchase Agreement contains the complete and exclusive obligations of Siemens. Any statements contained in this documentation do not create new warranties or restrict the existing warranty.

We would further point out that, for reasons of clarity, these operating instructions cannot deal with every possible problem arising from the use of this device. Should you require further information or if any special problems arise which are not sufficiently dealt with in the operating instructions, please contact your local Siemens representative.

General

This device is electrically operated. In operation, certain parts of this device carry a dangerously high voltage.

Failure to heed warnings may result in serious physical injury and/or material damage.

WARNING ! Only appropriately qualified personnel may operate this equipment or work in its vicinity. Personnel must be thoroughly familiar with all warnings and maintenance measures in accordance with these operating instructions.

Correct and safe operation of this equipment requires proper transport, storage and assembly as well as careful operator control and maintenance.

Personnel qualification requirements

Qualified personnel as referred to in the operating instructions or in the warning notes are defined as persons who are familiar with the installation, assembly, startup and operation of this product and who possess the relevant qualifications for their work, e.g.:

- Training in or authorization for connecting up, grounding or labelling circuits and devices or systems in accordance with current standards in safety technology;
- Training in or authorization for the maintenance and use of suitable safety equipment in accordance with current standards in safety technology;
- First Aid qualification.

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1. Introduction

This manual describes the functions of the CP 2430 and the procedure for programming the module. Before you read this manual, it is assumed that you know the contents of the chapter "SINEC S1/AS-I Introduction and Basic Information".

We recommend the following procedure when...

- ...You want an overall picture of SINEC S1. ➔ Read the manual "SINEC S1/AS-I Introduction and Basic Information". This manual contains general information about SINEC S1.
- ...You want to know how to program the CP 2430. ➔ Read the manual "SINEC S1/AS-I Introduction and Basic Information", Chapter 1 Section 1.5 "The Master Mode". You should also read Chapters 3 and 4 in this manual.
- ...You want to start up the CP 2430 PLC master module. ➔ You will find the information you require in Section 2.1 'Overview of the Module' and in Chapter 3 'Standard Operation of the CP 2430 (Mode 1)'.
- ...You want to create a PLC program for standard applications. ➔ Chapter 3 contains all the information you require for standard operation.

1.1 General Information

1.1.1 Overview of the Chapters

Chapter 1 Introduction

This chapter contains general information about the layout and use of the manual.

Chapter 2 Technical Description and Guidelines for Installing the CP 2430

This chapter provides an overview of the modes, installation and startup and the display and operating elements of the CP 2430.

Chapter 3 Standard Operation of the CP 2430 (Mode 1)

Chapter 3 describes standard operation of the module which is particularly straightforward and easy to use. This mode allows direct access to the inputs and outputs of the AS-I slave just like digital I/O modules of the SIMATIC PLC.

Chapter 4 Extended Operation (HDB Mode) of the CP 2430 (Modes 2 and 3)

Chapter 4 describes the extended mode of the CP 2430 that requires standard handling blocks (HDBs) in the controller. When using this mode, it is, for example, possible to assign parameters to the AS-I slaves or modify the slave addresses by programming the changes in an S5 program.

Chapter 5 Multiprocessor Mode

Chapter 5 contains information about operating the CP 2430 in multiprocessor PLCs.

Chapter 6 Replacing a Defective Slave/Automatic Address Programming

This chapter explains how you can replace a defective AS-I slave simply and easily.

Chapter 7 Error Indicators on the CP 2430/Dealing With Problems

This chapter lists and explains the possible error and fault indications on the CP 2430 and describes ways to eliminate problems.

1.1.2 Symbols and Conventions Used in the Text

General symbols in the text:

- ✓ This symbol indicates an action for you to perform.
- ☞ This symbol highlights special features or dangers.

1.1.3 Requirements for Understanding the Manual

To fully understand the manual, you should already be familiar with the following:

- Programming in STEP 5
- The 'SINEC S1/AS-I Introduction and Basic Information'.

1.1.4 Sample Programs/Readme File

The floppy disk accompanying this manual contains sample programs in the directory \CP2430\English that provide you with instructions and help when programming the CP 2430. These sample programs are explained. The readme.txt file contains up-to-date information and explains any restrictions that apply to the use of the CP 2430.

1.1.5 Further Information

Order numbers for the products referred to in this manual can be found in the latest release of the appropriate catalog.

If you require further information about SINEC S1 and AS-I components, please contact your local SIEMENS office.

1.1.6 Hotline

If you have technical questions, please use our hotline on the following numbers:

xx49-9131-7-43147

xx49-9131-7-43157

2. Technical Description and Guidelines for Installing the CP 2430

This chapter outlines the basic functions of the SINEC S1 CP 2430 master module and explains how the module is installed and started up.

You will learn the following:

- Which PLC systems can be operated using the CP 2430 on SINEC S1.
- How to install the CP 2430.
- Which modes are supported by the CP 2430.

2.1 Overview of the Module

2.1.1 Introduction

The CP 2430 module can be operated in the programmable logic controllers (PLCs) S5-115U, S5-135U, S5-155U. It allows the connection of two independent AS-I chains to the programmable logic controller mentioned above.

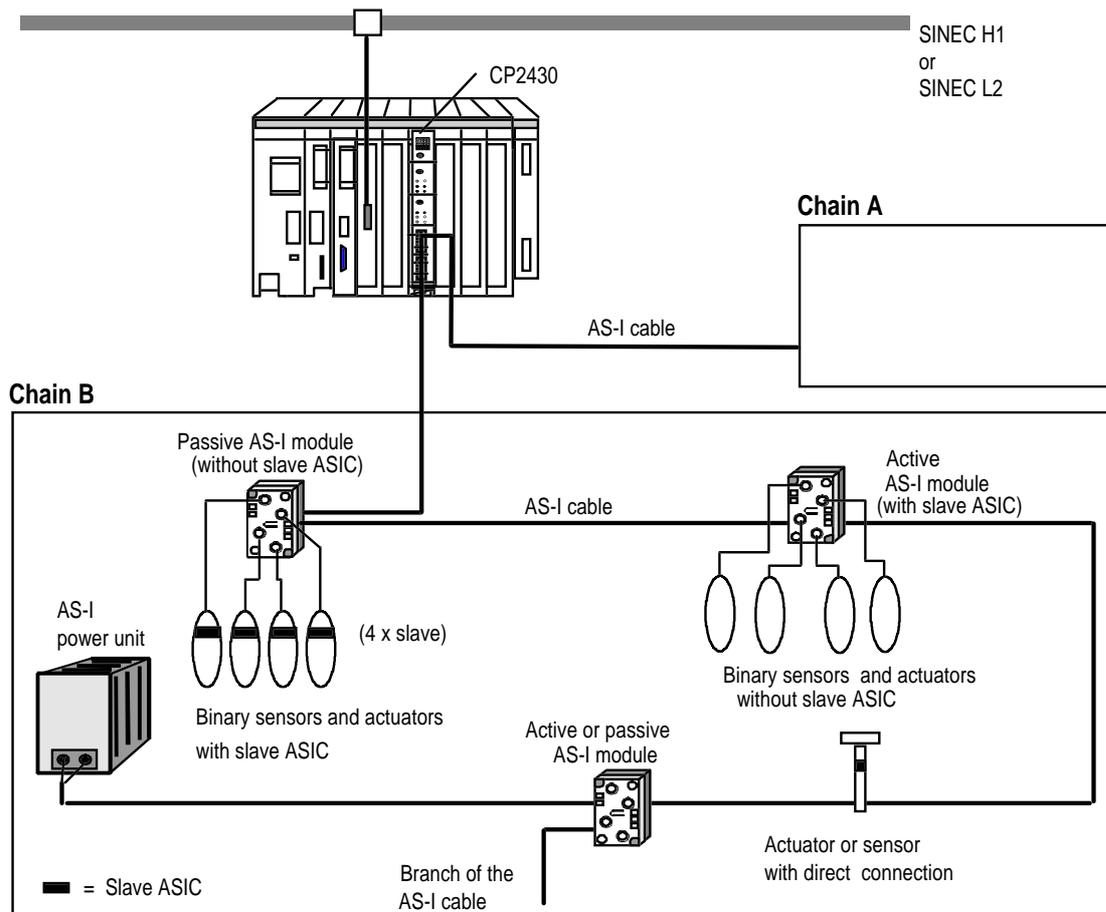


Figure 2-1 Possible Applications of the SINEC S1 CP 2430 Module

Components Supplied

The product CP 2430 includes the following components:

1. The CP 2430 module
2. Two connectors for connection to the AS-I cable

If you want to order more of these connectors, please contact your SINEC sales office.

For further products, refer to /3/ or contact your SINEC sales office.

2.1.2 Technical Data of the Module

The essential technical data of the CP 2430 module is as follows:

- The CP occupies one slot in the SIMATIC PLC. If you operate the module in the S5-115U, an adapter module is required.
- The CP 2430 module is a double master. This means that two AS-I chains operating completely independently of each other can be connected. The CP 2430 has two independent channels A and B to which the two AS-I chains A and B can be connected.
- From the point of view of the PLC, the CP 2430 uses 32 input bytes and 32 output bytes if the I/O mode is activated for both AS-I chains (channels A and B). If the I/O mode is only activated for one channel, the addresses occupied are reduced to 16 input bytes and 16 output bytes. If the I/O mode is disabled for both channels, the module does not require any I/O address area.
- The programmable logic controller can access the inputs and outputs of the AS-I slaves using the I/O area of the CP 2430 in the same way as it accesses the inputs and outputs of a digital I/O module.
- The CP 2430 has two pages with consecutive interface numbers. A page is assigned to each channel. Using the pages, the S5 programmable logic controller can transfer AS-I commands to the CP 2430 using standard handling blocks. As an option, it is also possible to exchange I/O data of the AS-I slaves between the CP 2430 and S5 PLC using handling blocks.
- The page interface provided by the CP 2430 is an efficient mechanism for handling AS-I commands. The option of using the page interface to transfer the input and output data of the AS-I slave allows address area to be saved in the PLC.
- The AS-I slave configuration is saved using switches on the front panel or by special commands.
- The AS-I cable is connected using connectors with screw contacts.

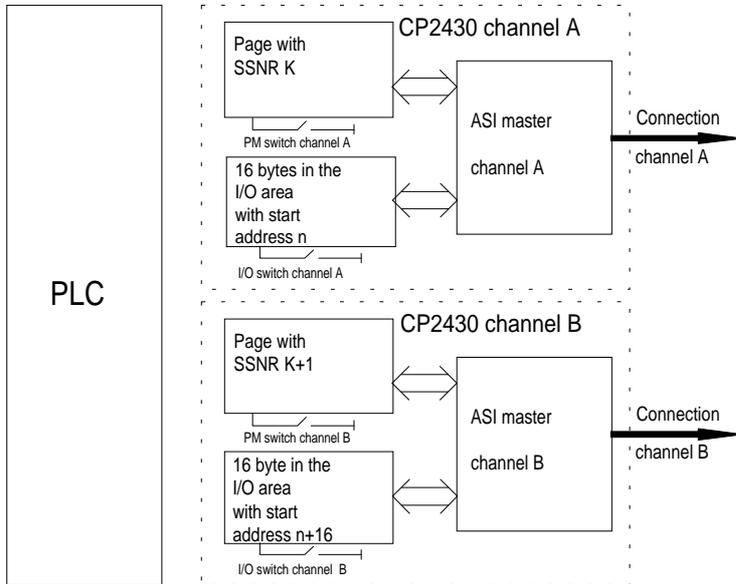
Further Technical Data

Bus cycle time	5 ms with 31 slaves
Configuration	By switches on the front panel or using special commands
AS-I profiles supported	Without handling blocks: M0 With handling blocks: M1
AS-I interface connection	Using connectors with screw contacts
Address range	32 input bytes and 32 output bytes of the PLC if the I/O mode is set for both channels. If the I/O mode is activated for only one channel, the CP 2430 occupies 16 input bytes and 16 output bytes. If the I/O mode is disabled for both channels, the CP 2430 does not occupy any I/O address area.
Number of pages	The CP 2430 has two pages. Each channel is assigned one page. An interface number (page address) is only occupied when the page mode is activated for the corresponding channel (selected with DIP switch).
Power supply SIMATIC backplane bus	5 V d.c.
Power supply from the AS-I cable	According to the AS-I specification
Power consumption from DC 5 V	typically 700 mA
Power consumption from the AS-I cable	maximum 100 mA
Ambient conditions	
● Operating temperature	0 to 60°C
● Transport and storage temperature	-40°C to +70°C
● Relative humidity	max. 95% at +25°C
● Weight approximately	400g
● Space required	1 slot

Table 2-1 Technical Data

2.1.3 Connection Between the PLC and CP 2430

Figure 2-2 shows the connection between the PLC and the CP 2430 module. As already mentioned, the two channels A and B on the module are completely independent of each other. Each channel has an I/O interface and a page interface that can be activated or deactivated using a DIP switch. If the I/O interface is not activated, the I/O area assigned to it is not used by the module. In the same way, if the page interface is disabled, the interface number (page address) is not used by the module.



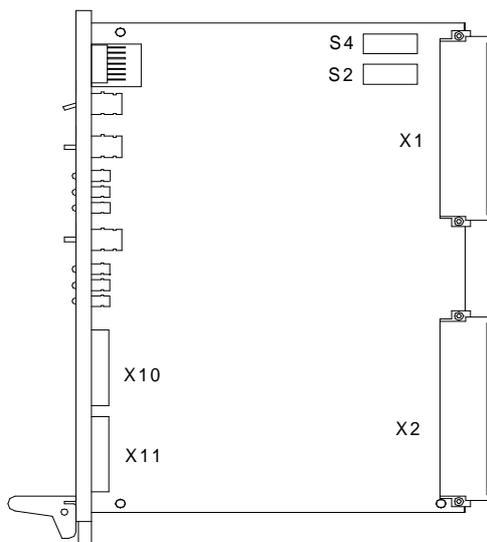
The I/O data of the AS-I slaves are exchanged between the PLC and CP 2430 on the I/O interface. Access is transparent just as with an I/O module. AS-I commands are transferred using the page interface (handling block mode). As an option, the I/O data of the AS-I slaves can also be transferred using the page interface. In this case, the I/O interface for the channel in question is disabled.

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Figure 2-2 Connection Between the PLC and CP 2430

2.1.4 Design and Interfaces of the CP 2430

Design of the CP 2430



This diagram illustrates the design of the CP 2430. The addresses and modes of the module are set using switches S2 and S4 (see Section 2.1.5)

Figure 2-3 Layout of the CP 2430

Pinouts of the CP 2430 Interfaces

Table 2-2 shows the pinouts of the electrical interfaces of the CP 2430. These interfaces are as follows:

- Backplane connector X1/X2
- Male connectors X10 or X11 for connecting the AS-I cable for channel A or B

X1	D	B	Z	X2	D	B	Z
Pin No.	Signal Name	Signal Name	Signal Name	Pin No.	Signal Name	Signal Name	Signal Name
2	-	Ground	P5	2	-	Ground	+5V
4	-	PESP	-	4	-	-	-
6	ADB12	ADB0	RESET	6	-	-	-
8	ADB13	ADB1	MEMR	8	-	-	-
10	ADB14	ADB2	MEMW	10	-	-	-
12	ADB15	ADB3	RDY	12	-	-	-
14	-	ADB4	DB0	14	-	-	NAU
16	-	ADB5	DB1	16	-	-	-
18	-	ADB6	DB2	18	-	-	-
20	-	ADB7	DB3	20	-	-	-
22	-	ADB8	DB4	22	-	-	-
24	-	ADB9	DB5	24	-	-	-
26	-	ADB10	DB6	26	-	-	-
28	-	ADB11	DB7	28	-	-	-
30	-	BASP	-	30	-	-	-
32	-	Ground	-	32	-	+5V	-

Table 2-2 Pin Assignment of the Backplane Connectors X1 and X2

X10 (Channel A)		X11 (Channel B)	
Pin No.	Signal Name	Pin No.	Signal Name
1	ASI +	1	ASI +
2	ASI -	2	ASI -
3	ASI +	3	ASI +
4	ASI -	4	ASI -

Table 2-3 Pin Assignment of the Male Connectors X10 and X11

2.1.5 Settings on the CP 2430

The start address of the I/O area and the mode of the two AS-I channels of the CP 2430 are set using switch group S2. With switch group S4, you select the interface number. Both switch groups are located on the module next to the upper backplane connector X1.

2.1.5.1 Setting the Start Address of the I/O Area

The CP 2430 occupies 32 input bytes and 32 output bytes in the I/O area of the S5 PLC starting at the selected start address if the I/O mode is activated for both channels. The start address is set using DIP switches (switch group S2).

Example:

If the value 0 is set as the start address, the CP 2430 occupies input bytes 0 to 31 and output bytes 0 to 31 that are assigned to the two channels as follows:

Channel A	input byte 0 to 15	output byte 0 to 15
Channel B	input byte 16 to 31	output byte 16 to 31

Table 2-4 Input and Output Assignment

If the I/O mode is switched off on one channel, the input and output bytes are not used and are free to be used by other modules.

The start address is selected in increments of 32 using switch group S2. The DIP switches of S2 are labeled S2-1, S2-2 to S2-7.

S2-1	S2-2	S2-3	Start Address
OFF	OFF	OFF	0
OFF	OFF	ON	32
OFF	ON	OFF	64
OFF	ON	ON	96
ON	OFF	OFF	128
ON	OFF	ON	160
ON	ON	OFF	192
ON	ON	ON	224

Table 2-5 Setting the Start Address

The default setting of the start address is 0.

Examples:

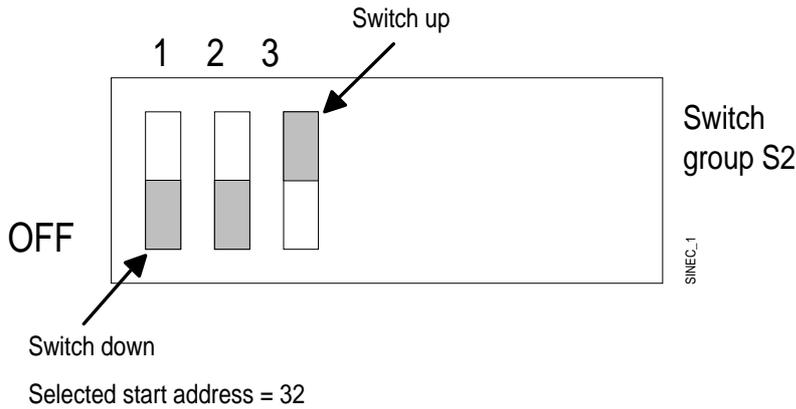


Figure 2-4 Switches for the Start Address

In the digital I/O area from 0 to 127, a maximum of four CP 2430 modules each with two AS-I chains with a total of 1024 input and 1024 output bits can be plugged in when the I/O area of both channels is activated on these modules. In this case, the complete address area for the digital I/Os is used. No further digital I/Os can then be plugged into the programmable logic controller.

Since the CP 2430 can also be addressed in the area of the analog I/Os, a further four CP 2430 modules can be plugged in from I/O byte 128 to 255 if the I/O mode is activated on both channels of these modules. In this case the complete address area for the analog I/Os is occupied and no further analog modules can be plugged in.

The CP 2430 can be addressed in the same way as “normal” I/O modules using the extended I/O area (O area) providing the CPU being used supports this type of addressing. For further details, refer to the manual of your CPU.

2.1.5.2 Setting the Mode

You also set the mode of your CP using switch group S2.

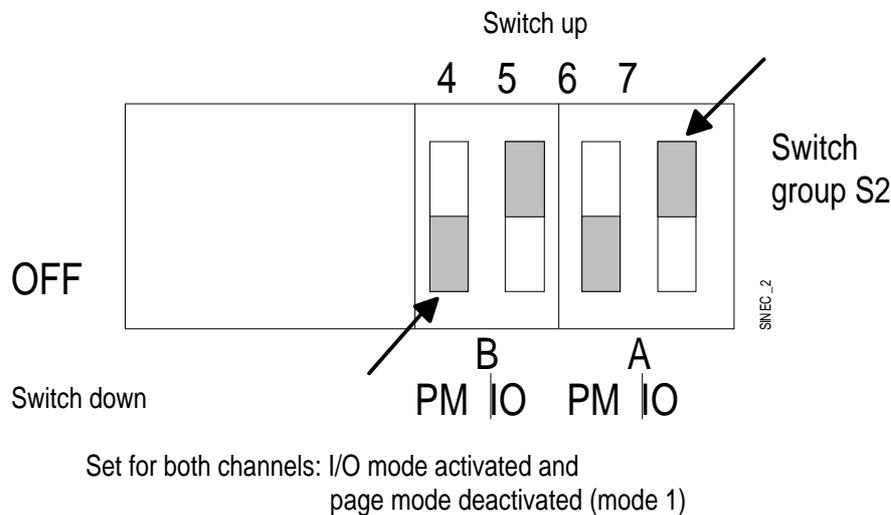


Figure 2-5 Switches for Setting the Mode

Using these switches, you can set the mode for channel A and channel B separately. You can also activate or deactivate the page mode (switch PM = page mode) and the I/O mode (switch IO = Input/Output mode) on the module separately for each channel.

The I/O mode for the corresponding AS-I channel is activated or deactivated with the I/O switch. The page mode for the corresponding channel is activated or deactivated with the PM switch.

The following table shows the switch settings and their significance:

PM Switch	IO Switch	Mode
OFF	OFF	<p>The corresponding channel of the AS-I master is deactivated (recognizable by the LEDs for this channel remaining unlit).</p> <p>The I/O address area for this channel is not used and is then available for other modules.</p> <p>The page reserved for the channel is also not used.</p>
OFF	ON	<p>Mode 1: Standard mode, only the I/O mode is active, the page mode is disabled. (Setting when the module is supplied)</p> <p>The page reserved for the channel is not used.</p>
ON	OFF	<p>Mode 3: Only page mode</p> <p>The I/O address area selected for this channel is not used and is free for other modules.</p>
ON	ON	Mode 2: I/O mode and page mode

Table 2-6 Modes

2.1.5.3 Setting the Interface Numbers

The interface number (page address) is set with switch group S4. The CP 2430 occupies two consecutive interface numbers for channel A and channel B.

To select the interface number for channel A, the values of the switches set to "ON" in the following table must be added. The interface number of channel B is the next consecutive interface number.

Switch		Value					
S4-1	ON = 128 OFF = 0						
S4-2		ON = 64 OFF = 0					
S4-3			ON = 32 OFF = 0				
S4-4				ON = 16 OFF = 0			
S4-5					ON = 8 OFF = 0		
S4-6						ON = 4 OFF = 0	
S4-7							ON = 2 OFF = 0

Table 2-7 Switches for the Interface Numbers

Example of an interface number setting:

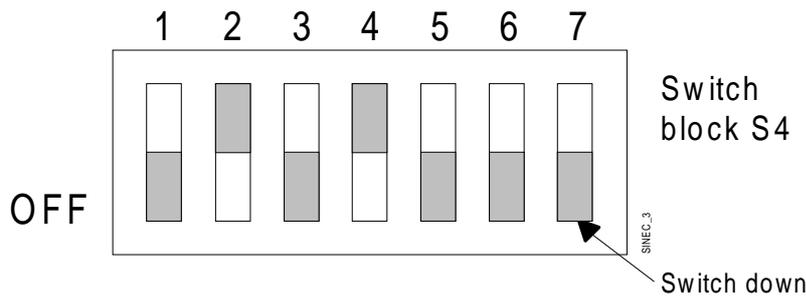


Figure 2-6 Example of the Interface Number Setting (Interface Number Selected: Channel A=80, Channel B=81)

Switch	Value						
S4-1	OFF = 0						
S4-2		ON = 64					
S4-3			OFF = 0				
S4-4				ON = 16			
S4-5					OFF = 0		
S4-6						OFF = 0	
S4-7							OFF = 0
Interface no. Channel A	64 + 16 = 80						
Interface no. Channel B	= Interface number channel A + 1 = 81						

Table 2-8 Example of an Interface Number Setting

👉 If switch group S2 is deactivated for both channels for the HDB mode, (switch PM = OFF), the CP 2430 does not occupy any interface number, in other words, the settings of switch group S4 are irrelevant.

2.1.6 Installing the CP 2430 in the PLC Rack

When supplied (mode 1: only I/O mode), the CP 2430 can be operated in the central controllers and expansion units in **all CP and I/O slots** (it cannot be plugged in directly into the S5-115U). The module can be operated without a fan.

If the page mode is activated for one or both channels, the CP 2430 must be plugged into a CP slot.

When installing the CP 2430 in the S5-115U programmable logic controller, an adapter module is necessary.

 **Modules must only be plugged in or removed when the power supply to the rack is turned off. The modules contain electrostatically sensitive devices (ESD) and you must take the usual measures to avoid electrostatic charges.**

The following tables show the slots available for both modes.

Slots for the SINEC CP 2430 (max. 4 x CP 2430 modules per S5-115U to 155U)

CP 2430 in the I/O mode:

Rack / Device	Accessories	Slots for the CP 2430							
S5-115U		0	1	2	3	4	5	6	7
CR 700-0LA	Adapter module								
CR 700-0LB	Adapter module								
CR 700-1	Adapter module								
CR 700-2	Adapter module								
CR 700-3	Adapter module								
ER 701-2	Adapter module								
ER 702-3	Adapter module								

Table 2-9 Slots for the I/O Mode

CP 2430 in the HDB mode:

Rack / Device	Accessories	Slots for the CP 2430							
S5-115U		0	1	2	3	4	5	6	7
CR 700-0LB	Adapter module								
CR 700-2	Adapter module								
CR 700-3	Adapter module								
ER 702-3	Adapter module								

Table 2-10 Slots for the HDB Mode

 = possible slot

CP 2430 in the I/O mode:

Rack / Device	Accessories	Slots for the CP 2430																					
S5-135U/-155U		3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139	147	155	163	
CC 135U/155U; CC 135-U.;CC135-K..																							
CC 155																							
EG 183U																							
EG 184U																							
EG 185U																							
EG 187U																							

Table 2-11 Slots for the I/O mode

CP 2430 in the HDB mode:

Rack / Device	Accessories	Slots for the CP 2430																					
S5-135U/-155U		3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139	147	155	163	
CC 135U/155U; CC 135-U..																							
CC 135-K..																							
CC 155																							
EG 185U																							

Table 2-12 Slots for HDB Mode

 = possible slot

 **The CP is approved for the following CC-EU connections:**

IM 304, IM 314	For HDB and/or I/O mode
IM 307, IM 317	
IM 300-5, IM 312-5	For I/O mode (HDB mode not possible!)
IM 305	
IM 306	

Connecting the CP 2430 to the AS-I Cable

The AS-I cable is connected using the connector supplied that has two pairs of terminals that are jumpered internally inside the CP 2430.

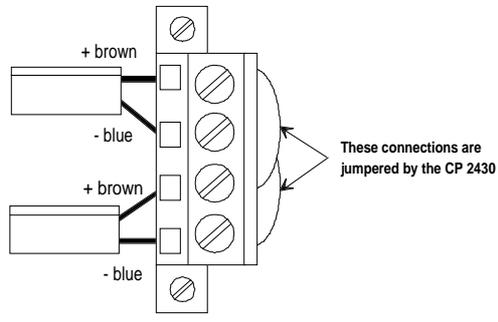


Figure 2-7 Connector for the AS-I Cable

The second pair of terminals is for connecting the AS-I power supply unit or for a branch of the AS-I cable. The AS-I power supply unit can, however, be connected at any other point on the AS-I cable.

Noise Immunity/Grounding

To ensure the noise immunity of the CP 2430, the PLC and AS-I power supply unit must be grounded correctly. For more detailed information, refer to the system manuals of the PLCs and the description of the AS-I power supply unit.

2.1.7 Control and Display Elements of the CP 2430

The following diagram shows the front panel of the CP 2430 with the control and display elements. These are described in detail below.

The front panel contains a matrix display of the active slaves that can be switched over to channel A or B. Below this display there are two separate fields for the switches and displays of channels A and B and the connections for the two AS-I chains.

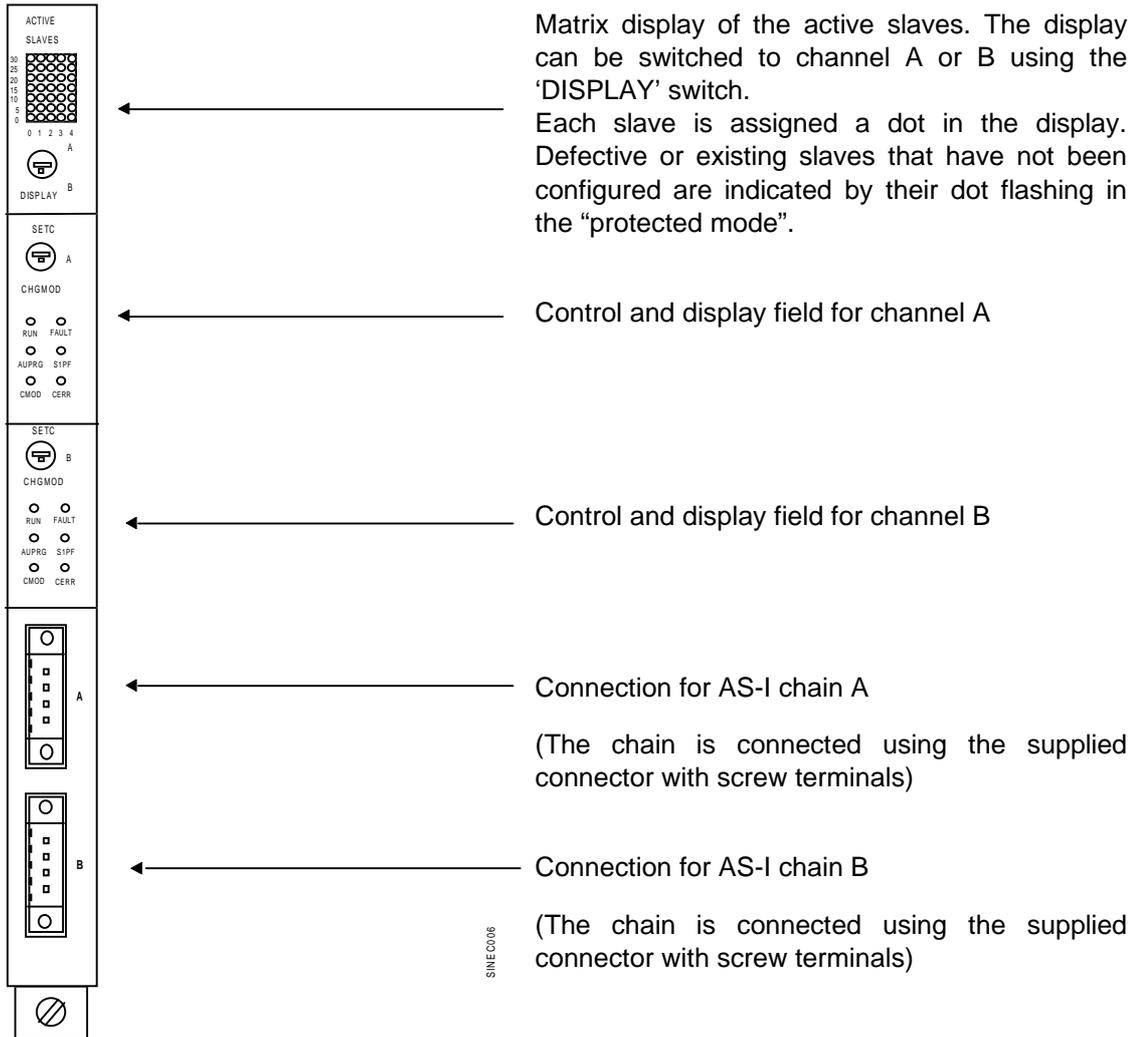


Figure 2-8 Front Panel of the CP 2430

ACTIVE SLAVES The matrix displays which slaves on the AS-I cable are activated. The CP 2430 can only exchange data with activated slaves. Each slave is assigned a dot in the display that lights up if the slave is activated.

Defective or existing slaves that have not been configured are indicated by the display flashing in the protected mode.

The display can be switched between channel A and B using the 'DISPLAY' switch.

The following statuses can be indicated by the displays for each channel:

- RUN**
1. LED lit continuously:
Indicates that the CP has started up correctly.
 2. LED flashes
This indicates that the CP 2430 is waiting for synchronization by the S5 PLC (HDB SYNCHRON). The RUN LED can only flash when the page mode is activated for the particular channel (switch group S2, switch PM).
- FAULT**
1. LED lit continuously:
This indicates that the CP 2430 has detected a hardware fault. In this case, the CP must be replaced.
 2. LED lit while pressing the mode selector
This indicates that the CP cannot accept the mode change either because a slave with address 0 exists or because the CP is not in the configuration mode when you switch to SET CONFIG.
- AUPRG**
- This indicates that automatic address programming of a slave is possible. The automatic address programming makes it much easier to exchange a defective slave on the AS-I cable.
- If the AUPRG display is lit, this indicates that **one** configured slave does not exist on the AS-I cable (for example, a station has failed).
- If the AUPRG display is lit, you can replace the failed slave with an identical slave with the address 0 (default address). The CP then automatically reprograms the address 0 to the address of the failed slave.
- S1 PF**
- S1 Power Fail. Indicates that the voltage supplied by the AS-I power unit on the AS-I cable is too low or has failed.
- CMOD**
- Configuration Mode. This displays the operating mode.

Display on: Configuration mode

Display off: Protected mode

The configuration mode is only required when installing the CP 2430. In the configuration mode, the CP 2430 activates all connected slaves and exchanges data with them. For more information about the configuration mode/protected mode, refer to Section 3.1.

CERR

Here, the CP 2430 indicates whether the slave configuration detected on the AS-I cable matches the configuration stored on the CP (LPS). If they do not match, the CERR display is lit

The CERR display is lit in the following situations:

- When a configured AS-I slave does not exist on the AS-I cable (e.g. fault on the slave).
- When a slave exists on the AS-I cable but has not been configured.
- When a connected slave has different configuration data (I/O configuration, ID code) from those configured on the CP.
- When the CP is in the offline phase.

Switch

SETC/CHGMOD

The switch is only required for configuring the CP 2430 in standard operation. The switch is only activated in the STOP mode of the PLC and has the following functions.

- Switch in CHGMOD position -> mode change

This position brings about a change between the configuration mode and the protected mode. The mode is signaled by the "CMOD" indicator.

- Switch in SETC position -> automatic configuration.

If the CP is in the configuration mode (CMOD indicator on) and if the switch is set to the SETC position, the CP is configured automatically. Configuration then involves the following steps:

1. The existing slave configuration indicated by the "ACTIVE SLAVES" LED is saved by the CP as the desired configuration (in non-volatile memory).
2. The CP then switches over to the protected mode.

For more information on configuring the CP 2430, refer to Section. 3.1

2.1.8 Types of Operation with the CP 2430

With the CP 2430 module, 2 types of operation are possible:

- Standard operation (without function blocks).
- Extended operation (with function blocks).

The difference between the two types of operation is as follows:

Standard Operation (mode 1)

In this type of operation, the CP 2430 operates as a conventional digital input/output module. For each slave on the AS-I cable four input and four output bits are reserved in the process image of the analog I/Os.

The input/output data are transferred to and from the slaves on the AS-I cable.

In standard operation, no commands or special parameters can be transferred to the slaves on the AS-I cable. This type of operation corresponds to the profile M0 of the AS-I master specification.

Extended Operation (modes 2 and 3)

In extended operation, the PLC programmer has the complete range of functions available in the AS-I system. In particular, the assignment of parameters to slaves with an integrated AS-I connection is possible. This type of operation corresponds to the profile M1 of the AS-I master specification.

The handling blocks (HDBs) are required on the S5 PLC for extended operation. These handling blocks are integrated in some of the S5 CPUs. For other S5 CPUs, the handling blocks can be ordered separately.

3. Standard Operation of the CP 2430 (Mode 1)

Standard operation represents the most common and at the same time simplest use of the CP 2430. It allows direct access to the inputs and outputs of the slave (e.g. bus modules) just as with digital I/O modules of the SIMATIC PLC. When the CP is supplied, this type of operation is already set, no handling blocks are required.

3.1 Configuring the CP 2430 for Standard Operation

The CP 2430 is capable of two operating modes, the configuration mode and the protected mode. When the CP 2430 is delivered, the configuration mode is set and this is signaled by the CMOD LED being lit.

- **Configuration Mode:**
The configuration mode is used to install and start up an AS-I network. In the configuration mode, the CP 2430 can exchange data with every slave connected to the AS-I cable. Any slaves that are added later are detected immediately by the master and included in the cyclic data exchange. After testing the PLC program, the CP 2430 can be changed to the protected mode using the switch on the front panel.
- **Protected Mode**
If the CP 2430 is in the protected mode, it only exchanges data with slaves that are "configured". In this sense, "configured" means that the slave address saved on the CP and the configuration data stored on the CP match the values of a slave.

Configuration of the CP 2430 during installation and start-up of the AS-I network.

The following situation is assumed:

- The connected AS-I slaves are supplied with addresses (address programming device).
- The AS-I bus is complete, i.e. with the AS-I power supply unit in operation.

To configure the CP 2430 in standard operation while installing the AS-I network, follow the steps outlined below:

- ✓ Switch the PLC to the STOP mode
- ✓ Change the CP 2430 to the configuration mode (switch the mode selector to the bottom position; the CMOD indicator lights up). If the CP is already in the configuration mode (as supplied), this step can be omitted.
- ✓ Switch the PLC to RUN and test your program.
Note:
In the configuration mode, you can add or remove slaves on the AS-I cable. Newly added slaves are activated immediately by the CP 2430.
- ✓ On completion of the installation of the AS-I slaves, switch the PLC to STOP
- ✓ Now move the mode selector of the CP 2430 to the upper position. The CP adopts the configuration displayed by the "ACTIVE SLAVES" display as the desired configuration and switches to the protected mode.

In the protected mode, the "CMOD" LED is switched off.

- ✓ Switch the PLC to RUN. The installation of the CP is then completed.

Simplified Configuration

Once you are certain that all the slaves on the AS-I cable are functioning correctly (for example, after a CP 2430 has been replaced), you can start up the CP 2430 as follows:

- ✓ Switch the PLC to STOP.
 - ✓ Change the CP 2430 to the configuration mode (set the "SETC/CHGMD" switch to the bottom position, the CMOD indicator lights up). If the CP is already in the configuration mode (as supplied), this step can be omitted.
 - ✓ Now move the "SETC/CHGMD" switch on the CP 2430 to the upper position. The CP then adopts the configuration displayed by the "ACTIVE SLAVES" indicator as the desired configuration and then switches to the protected mode.
In the protected mode, the "CMOD" LED is switched off.
 - ✓ Switch the PLC to RUN. The installation CP is then completed.
-  **The CERR indicator lights up briefly when the module changes to the protected mode.**

3.2 Addressing the CP 2430 in the PLC

In standard operation (Mode 1), the CP 2430 occupies 16 input and 16 output bytes in the I/O address area of the S5 programmable logic controller for each activated channel. This means that a maximum of 64 bytes can be occupied in the I/O address area per CP 2430. The start address of this address area is selected using switches on the CP 2430, see Section 2.1.5.1.

3.3 How the PLC Addresses the Slaves on the AS-I Cable

Each station (slave) on the AS-I cable is assigned a nibble by the CP 2430. The PLC can write (slave output data) and read (slave input data) this nibble. In this way, bidirectional slaves can also be addressed.

Of the 32 byte address area of the CP 2430, 31x4 bits are occupied by the AS-I slave data of channel A and 31x4 bits by the AS-I slave data of channel B. The remaining 2x4 bits are available for control commands and status messages on channel A or channel B of the CP 2430 (control nibble/status nibble).

Assignment for channel A:

Byte number	Bit 7-4	Bit 3-0	
n+0	Control/status nibble Bit 3 Bit 2 Bit 1 Bit 0	Slave 1 Bit 3 Bit 2 Bit 1 Bit 0	← PLC I/O bits ← Slave bits
n+1	Slave 2	Slave 3	
n+2	Slave 4	Slave 5	
n+3	Slave 6	Slave 7	
n+4	Slave 8	Slave 9	
n+5	Slave 10	Slave 11	
n+6	Slave 12	Slave 13	
n+7	Slave 14	Slave 15	
n+8	Slave 16	Slave 17	
n+9	Slave 18	Slave 19	
n+10	Slave 20	Slave 21	
n+11	Slave 22	Slave 23	
n+12	Slave 24	Slave 25	
n+13	Slave 26	Slave 27	
n+14	Slave 28	Slave 29	
n+15	Slave 30 Bit 3 Bit 2 Bit 1 Bit 0	Slave 31 Bit 3 Bit 2 Bit 1 Bit 0	

Assignment for channel B:

Byte number	Bit 7-4	Bit 3-0	
n+16	Control/status nibble Bit 3 Bit 2 Bit 1 Bit 0	Slave 1 Bit 3 Bit 2 Bit 1 Bit 0	← PLC I/O bits ← Slave bits
n+17	Slave 2	Slave 3	
n+18	Slave 4	Slave 5	
n+19	Slave 6	Slave 7	
n+20	Slave 8	Slave 9	
n+21	Slave 10	Slave 11	
n+22	Slave 12	Slave 13	
n+23	Slave 14	Slave 15	
n+24	Slave 16	Slave 17	
n+25	Slave 18	Slave 19	
n+26	Slave 20	Slave 21	
n+27	Slave 22	Slave 23	
n+28	Slave 24	Slave 25	
n+29	Slave 26	Slave 27	
n+30	Slave 28	Slave 29	
n+31	Slave 30 Bit 3 Bit 2 Bit 1 Bit 0	Slave 31 Bit 3 Bit 2 Bit 1 Bit 0	

n: Selected base address

Table 3-1 Assignment of the CP 2430 Interface

Table 3-1 shows the assignment of the CP 2430 interface (n is the start address of the I/O address area used by the CP 2430 which is set with switch group S2, see Section 2.1.5.1). The table shows the assignment of slave I/O bits to the I/O bytes of the PLC.

Example of Assigning the Connections

If AS-I modules are used as slaves on the AS-I cable, each of the connections on the AS-I module corresponds to exactly one bit in the PLC. The following example illustrates this assignment based on two AS-I modules with addresses 2 and 3.

	Slave 2				Slave 3			
PLC bit	7	6	5	4	3	2	1	0
Connection on AS-I module	4	3	2	1	4	3	2	1

Table 3-2 Assignment of the Connections on the AS-I Module

Explanation:

In this case, slave 2 corresponds to the AS-I module with address 2
 slave 3 corresponds to the AS-I module with address 3.

Example of how the PLC addresses a slave

The inputs and outputs of the AS-I slaves can be accessed just like standard modules of the digital I/Os of the SIMATIC PLC. The following example illustrates this standard procedure:

Example: CP 2430 being used with start address n= 64

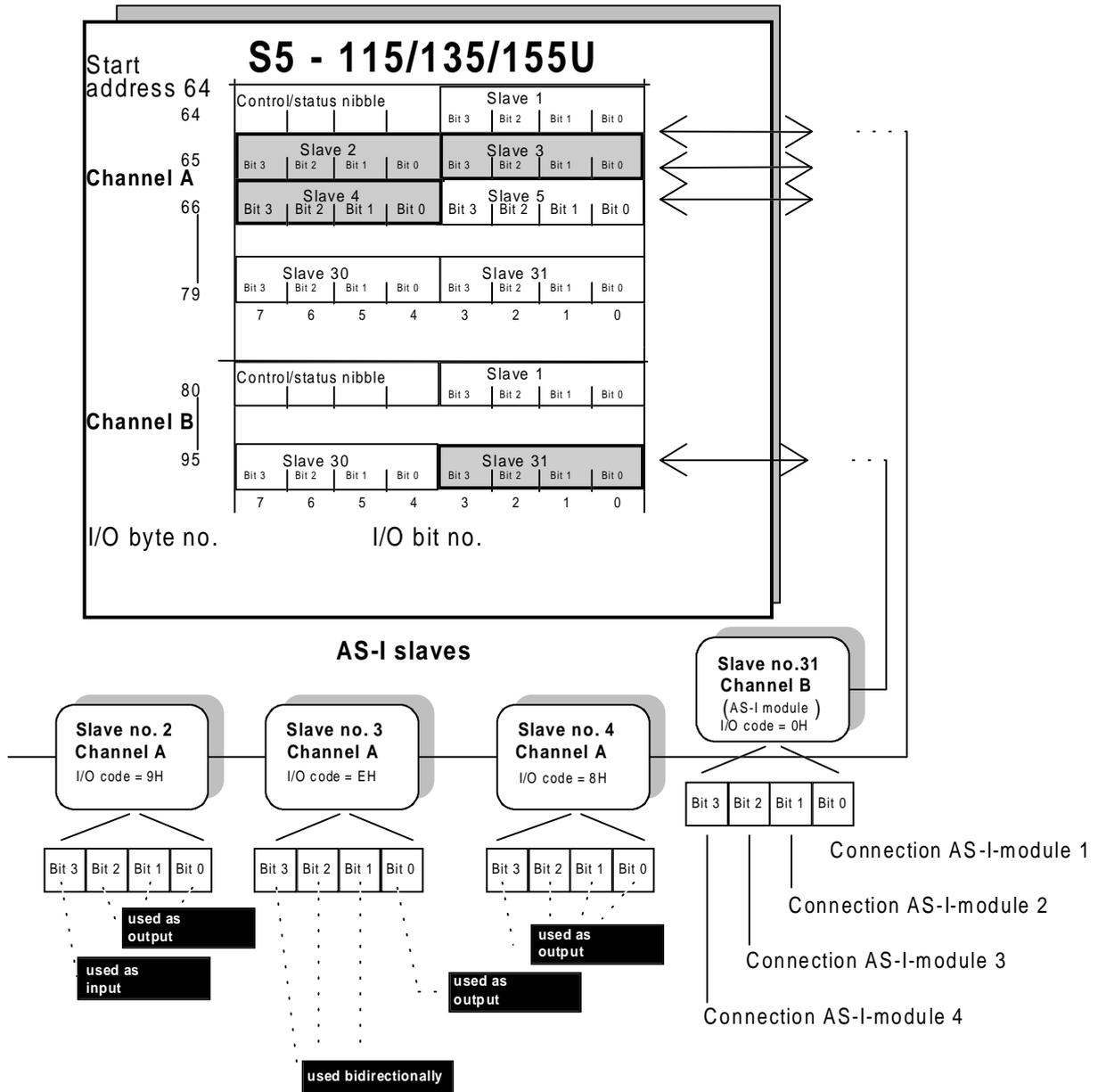


Figure 3-1. Mapping of the Slave Addresses on the PLC Slots

This arrangement results, for example, in the following I/O accesses if slave 2 and slave 4 are monodirectional slaves and slave 3 is a bidirectional slave:

- Slave 2, channel A

Bit 0	S Q 65.4
Bit 3	O I 65.7
- Slave 3, channel A

Bit 2	A I 65.2
Bit 2	= Q 65.2
- Slave 31, channel B

Bit 2	= Q 95.2
-------	----------

Each slave address is assigned four I/O bits in the address area of the PLC.

By setting the output bit of a slave, the corresponding output data of a slave are changed, by reading the input bit, the input data of a slave are read indirectly. This is the same reaction as with a conventional I/O module.

Access to the Control/Status Nibble

In addition to the I/O data, the CP 2430 also has a control/status nibble in the I/O data area that can be written or read.

- By **writing** this nibble, different CP 2430 modes can be selected.
- By **reading** this nibble, status and error bits of the CP 2430 can be read.

What do you have to do? A quick checklist

The list below is a brief overview of the points to bear in mind when creating the program Cyclic operation:

- ✓ You program the control nibble in the start-up OB so that the required mode is set.
- ✓ You scan the status nibble to make sure start-up was successful.
- ✓ In the cyclic mode, you write and read the I/O bytes as usual.
- ✓ In the cyclic mode, evaluate the status information (status nibble) to be able to react to an error.

The exact significance of the control and status nibble is described on the following pages.

Status Nibble (Reading)

When reading the control/status nibble, you obtain status information from the CP 2430.

	Bit 7	Bit 6	Bit 5	Bit 4
Meaning	0 = Voltage on the AS-I cable OK 1 = An ASI Power Fail has occurred. The data are invalid	0 = No error 1 = Configuration error	0 = CP startup active 1 = CP startup completed	0 = CP in protected mode 1=CP in configuration mode

Table 3-3 Assignment of the Status Nibble

Bit 7 "ASI Power Fail" This bit indicates whether or not the power supply on the AS-I cable is OK, too low or has failed completely.

If the voltage is incorrect or has failed the input data of all slaves are set to 0.

Bit 6 "Config Error" This bit indicates whether the configuration saved on the master matches the configuration of the slaves connected to the AS-I cable.

If the configurations do not match, the input data of missing or failed slaves are set to 0.

Bit 5 "Startup Bit" This bit indicates to the PLC whether or not the CP 2430 has completed its startup and internal initialization. This bit must be tested by the PLC during startup for the actual PLC program can be started.

Bit 4 "Mode" This bit indicates whether the CP 2430 is in the configuration mode or in the protected mode. This bit can, for example, be used to configure the CP 2430 (see example program).

Example:

If the CP 2430 has the start address 32 and if the actual user program is contained in PB3, the user program can be started following the CP startup using the following statements:

```

.
.
:A   I 32.5
:JC  PB 3
.
.

```

Control Nibble (Writing)

Using the control nibble, two different modes can be set for the CP 2430.

The control nibble is set by the user.

Bit 7	Bit 6	Bit 5	Bit 4	Meaning
0	0	0	0	Standard operation
0	0	0	1	Timeout mode

Example:

```
With the statements      :AN   Q   64.4
                        :S   Q   64.4
```

the timeout mode is set on a CP 2430 with start address 64.

When the timeout mode is set in the CP 2430 protected mode, a timeout is indicated when the PLC accesses the I/O area on the module and when there is a configuration error at the same time. A timeout is also indicated when the voltage on the AS-I cable is too low (ASI Power Fail).

4. Extended Operation (HDB Mode) of the CP 2430 (Modes 2 and 3)

For modes 2 and 3 (extended mode) the standard handling blocks (HDBs) are required on the S5 programmable logic controller. This section explains which extra functions are available compared with the standard mode when operating the CP 2430 with handling blocks.

4.1 Introduction

As an introduction to the following sections, the following aspects are explained:

- The differences between the types of operation in the HDB mode.
- How the CP 2430 is configured for the HDB mode.

Please remember that the channels A and B of the CP 2430 operate completely independently of each other. This means that different modes can be set for channels A and B. The setting of the modes for the individual channels is described in Section 2.1.5.2. **The HDB mode of the CP 2430 is only possible when the CP 2430 is plugged into a CP slot, see Section 2.1.6.**

4.1.1 HDB Mode Combined With the I/O Mode (Mode 2)

I/O Data of the AS-I Slaves

In mode 2, the **data exchange** (input and output data) with the AS-I slaves is just as in the **standard mode** using the input and output area of the SIMATIC PLC (I/O data). The CP 2430 behaves in this case just like a digital input or output module. The I/O interface is described in Chapter 3 (standard mode).

Command Calls

Command calls to the CP 2430 from the S5 program use **standard handling blocks (HDBs)**. With these command calls, the CP 2430 supports the complete range of functions in the actuator-sensor interface specification /2/ (to be more precise, all the functions marked as “mandatory” in the M1 profile are supported). These command calls, for example, allow a slave to be assigned parameters or a slave address to be modified.

Commands are sent to the CPU by calling the SEND handling block with **job number (ANR) 202**. If return values are required from the CP 2430, these are made available to the S5 program by means of a RECEIVE handling block call with **ANR 202**.

The channels A and B of the CP 2430 operate independent of each other. They are distinguished in the SEND and RECEIVE handling block calls by different interface numbers (SSNR).

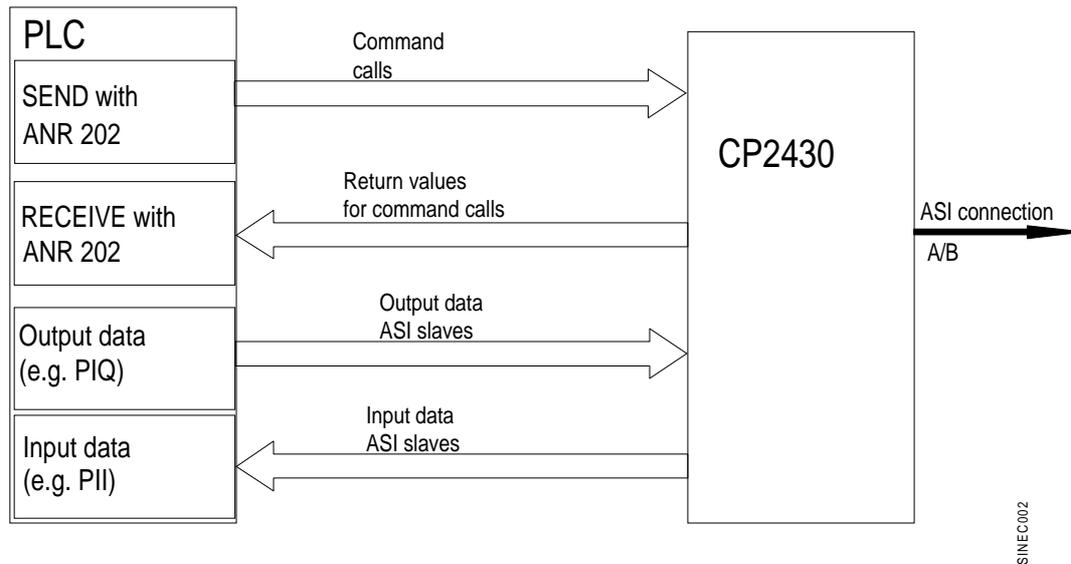


Figure 4-1 CP 2430 Interface to the S5 Program in the Combined I/O and HDB Mode (Mode 2)

4.1.2 Simple HDB Mode of the CP 2430 (Mode 3)

I/O Data of the AS-I Slaves

In mode 3, in contrast to mode 2, the input and output data for the AS-I slaves are also transferred from the S5 PLC to the CP 2430 and vice-versa using handling block calls.

The transfer of the output data of the AS-I slaves from the S5 PLC to the CP 2430 makes use of a SEND call with **job number (ANR) 200**.

The input data of the AS-I slaves can be read by the S5 PLC using a RECEIVE call with **ANR 201**.

The channels A and B of the CP 2430 operate independent of each other. They are distinguished in the SEND and RECEIVE handling block calls by different interface numbers (SSNR).

Command Calls

As in mode 2, the command calls to the CP 2430 make use of a SEND call with ANR 202. When return values are expected from the CP 2430, they can be read using a RECEIVE job with ANR 202.

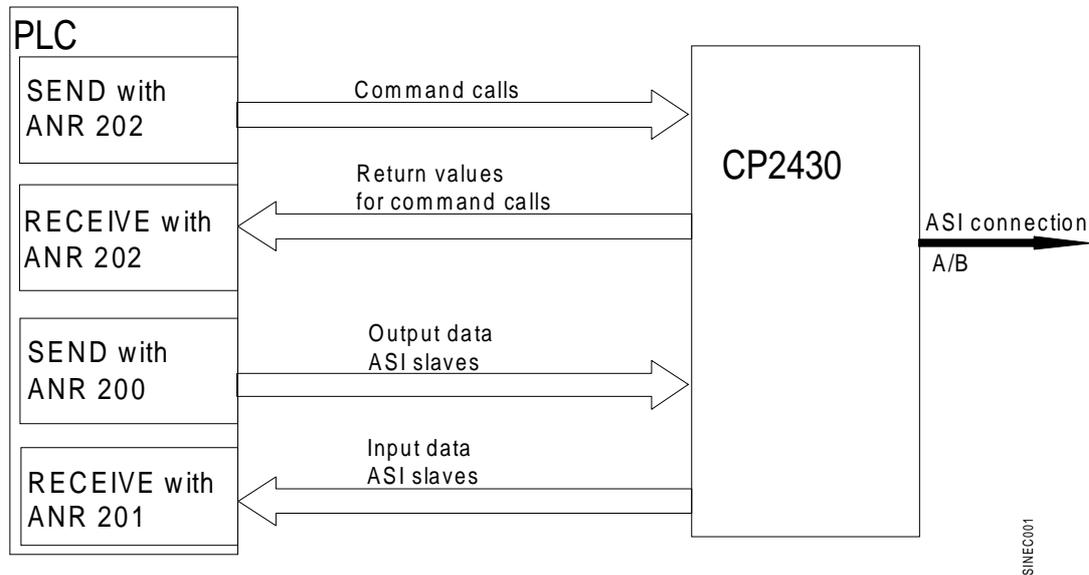


Figure 4-2 CP 2430 Interface to the S5 Program in the Simple HDB Mode (Mode 3)

4.1.3 Configuring the CP 2430 in the HDB Mode

When configuring the CP 2430 in modes 2 and 3, there are two alternatives:

- The CP 2430 can be configured using the control switches as in the standard mode, see Section 3.1.
- As an alternative, a CP 2430 channel can be configured by the S5 user program by transferring the configuration data to the CP 2430 from a data block using a SEND call with ANR 202. For more information about the exact procedure, refer to the description of the example program on the diskette accompanying the manual.

4.2 Using Handling Blocks (HDBs)

Apart from the I/O interface for each channel (A or B) the CP 2430 also has a page interface. Each of these interfaces is identified by the interface number (SSNR). Access to these interfaces is possible using the handling blocks.

4.2.1 Handling Blocks as a Program Interface

The STEP 5 user program can access the page interfaces of the CP 2430 using the following handling blocks (HDBs):

➤ **SEND HDB**

This is used to transfer commands or output data (mode 3) from the S5 PLC to the CP.

➤ **RECEIVE HDB**

This block is used to transfer return values from the CP 2430 to the S5 program. (Data in response to a command or input data of the AS-I slaves in mode 3).

➤ **CONTROL HDB**

This block is used to update the status word of a job sent to the CP 2430. This allows the status of a job sent to the CP to be read.

➤ **SYNCHRON HDB**

The SYNCHRON block of the CP 2430 is used for startup synchronization of the CP 2430 in the extended mode.

No further handling blocks are required to operate the CP 2430.

The handling blocks are available in special function blocks of the SIMATIC S5 PLC. The assignment of handling block to function block number can be seen in the following table:

HDB \ PLC	S5-115U	S5-135U/155U	
	CPU: 941, 942, 943 944, 945	CPU: 922, 928, 948	CPU: 946/47
SEND	FB244	FB120	FB120
RECEIVE	FB245	FB121	FB121
CONTROL	FB247	FB123	FB123
SYNCHRON	FB249	FB125	FB125

Table 4-1 Handling Blocks and Their FB Numbers

 For more detailed information about the handling blocks of the individual SIMATIC S5 PLCs, please refer to the descriptions of the programmable logic controllers in question or /4/.

4.2.2 Supplying the HDBs with Parameters

The HDBs must be supplied with the following interface parameters:

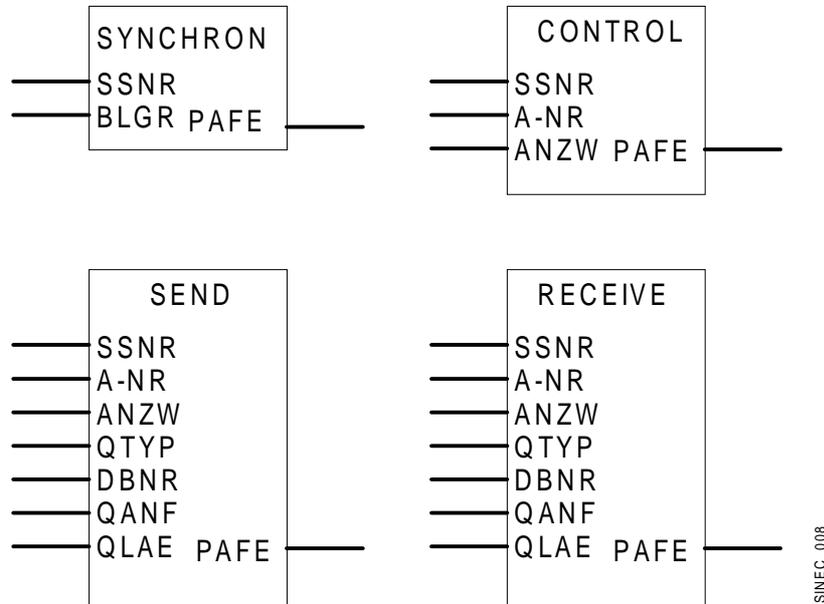


Figure 4-3 Interface Parameters of the HDBs

SSNR

The CP 2430 has separate interface numbers for channel A and channel B. The interface number decides which CP the HDB call is intended for and in the case of the CP 2430 whether an HDB call is intended for channel A or channel B of the CP. The interface number (page address) of channel A is set on the module using the switch group S4. The interface number for channel B is the next higher interface number. If, for example, SSNR 80 is set for channel A, channel B then has SSNR 81; see Section 2.1.5.3.

Example:

SSNR : KY 0 , 52 The number 52 specifies that the HDB call is for CP interface (page) 52.

A-NR

The job number specifies how the particular channel on the CP 2430 interprets the HDB call sent to it. A-NR 202 is used on the CP 2430 to transfer command jobs. A-NR 200 and A-NR 201 are used to transfer I/O data in mode 3. No further job numbers are used on the CP 2430.

Example:

A-NR : KY 0 , 202 The number 202 indicates to the CP that the HDB call is a command job.

ANZW

The status word contains the status of the jobs sent to the CP 2430. ANZW occupies two words in the S5 program. In the first word, the HDBs enter status information about the job. The next (second) word contains the number of data transferred to or from the CP 2430. A separate ANZW should be assigned in the user program for each SSNR/A-NR combination. For SEND (A-NR 202) and RECEIVE (A-NR 202) the same ANZW is used per channel. The structure of ANZW is explained in the appendix.

Example:

ANZW : FW 10 The status of the specified job number is entered in flag bytes 10 and 11, FW12 contains the transferred (byte) length.

BLGR

The field size is only specified with the SYNCHRON HDB and has no significance for the CP 2430. The CP 2430 operates with a fixed field size of 64 bytes.

Example:

BLGR : KY 0 , 0 The entry for BLGR has no significance for the CP 2430.

QTYP, DBNR, QANF, QLAE

These four block parameters determine the source of the data, in other words which data and how many data are transferred with a SEND call to the CP 2430.

Example:

QTYP : KS DB The SEND block transfers a total of 8 data words to the CP 2430 from
DBNR : KY 0 , 10 data block DB 10 starting at word 4.
QANF : KF +4
QLAE : KF +8

ZTYP, DBNR, ZANF, ZLAE

These four block parameters determine the destination of the data, in other words which data and how many data are transferred with a receive call to the CP 2430.

Example:

ZTYP : KS DB The RECEIVE enters the data fetched from the CP 2430 in DB 11 starting at
DBNR : KY 0 , 11 word 13. ZLAE = -1 instructs the HDB to transfer as much data as is
ZANF : KF +13 provided by the CP 2430. On completion of the data exchange, the
ZLAE : KF -1 transferred byte length is entered in the second word of ANZW.

PAFE

The parameter assignment error byte signals errors recognized by the HDB itself. The meaning of the PAFE byte is explained in the appendix.

Example:

PAFE : FY 20 Errors detected by the HDB are entered in FY 20. The flag 20.1 (=1) indicates that an error has been detected.

 **The diskette accompanying the manual contains example programs illustrating the use of the handling blocks on the CP 2430.**

4.2.3 Startup Synchronization in the HDB Mode

In the extended mode of the CP 2430, the **SYNCRON block** must be called in all PLC reset modes for **each interface** of the CP 2430 **for which the extended mode is set**. This synchronizes the interface with the programmable logic controller. The CP 2430 sets a field size of 64 bytes regardless of the value selected for the BLGR parameter in the HDB.

When the S5 PLC starts up, the AS-I slaves connected to the AS-I cable are reset and assigned new parameters (transition online - offline - online). Once the SYNCHRON block has run, the CP 2430 is once again ready for operation.

While the S5 PLC is in the STOP mode, the CP 2430 switches the outputs of the slave to 0.

4.3 Interface for AS-I Commands (Modes 2/3)

The following sections describe the AS-I command calls that can be sent by the S5 PLC to the CP 2430. Using these command calls, the CP 2430 makes available the entire functions of the master profile M1 of the AS-I master specification [2]. Using command calls, the CP 2430 can also be configured completely by the S5 PLC.

Command calls are sent using a SEND call with job number 202. By reading the status word of the SEND call, the program can check whether or not the job was executed free of errors. If an error occurs, the status word contains an error ID. The meaning of the error IDs is explained in the appendix.

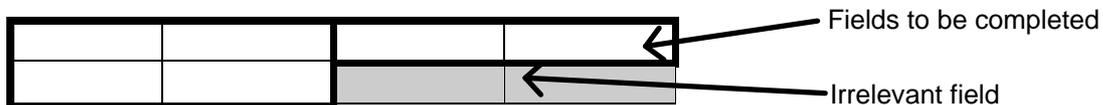
In the following command descriptions, it is assumed that data blocks are being used both as the data source of the SEND (QTYP) and the data destination of the RECEIVE (ZTYP).

The type of command is specified by the data block entry (job DB) whose content is transferred to the CP 2430 with the SEND job. The following sections illustrate which data block entries are required for the particular calls.

The commands require return values, these return values can be fetched from the CP 2430 on completion of the SEND job using a RECEIVE call with job number 202. The structure of the return values entered in a data block by the handling block is specified in the job itself.

Conventions used for representing the command field of the SEND DB:

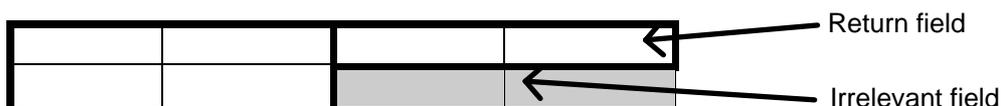
The relevant fields are on a white background, gray shaded fields are irrelevant.



The entry for a command must be entered in the job DB starting at the data word specified by the QANF parameter of the SEND HDB. The QLAE parameter contains the number of data words required for a command with the SEND HDB call. The required number of data words is specified in the particular command calls.

Conventions used for representing the command word data in the data block of the RECEIVE HDB:

The relevant fields are on a white background, gray shaded fields are irrelevant.



4.3.1 Overview of the Commands Supported by the CP 2430

For more detailed information about using the jobs, refer to the descriptions of the individual jobs in the 'SINEC S1/AS-I Introduction and Basic Information' manual, the PICS appendix and the detailed descriptions in /1/ and /2/0.

The following table contains an overview of the commands available:

Name / Chapter	Parameter	Data Returned	Code:
Set_Permanent_Parameter / 4.3.1.1	Slave address, parameter		0 0 H
Get_Permanent_Parameter / 4.3.1.2	Slave address	Parameter	0 1 H
Write_Parameter / 4.3.1.3	Slave address, parameter	Parameter echo (optional)	0 2 H
Read_Parameter / 4.3.1.4	Slave address	Parameter value	0 3 H
Store_Actual_Values / 4.3.1.5	None		0 4 H
Set_Permanent_Configuration / 4.3.1.6	Slave address, configuration		0 5 H
Get_Permanent_Configuration / 4.3.1.7	Slave address	Desired configuration data	0 6 H
Store_Actual_Configuration / 4.3.1.8	None		0 7 H
Read_Actual_Configuration_Data / 4.3.1.9	Slave address	Actual configuration data	0 8 H
Set_LPS / 4.3.1.10	LPS		0 9 H
Set_Offline_Mode / 4.3.1.11	Mode		0 A H
Select_Autoprogramming / 4.3.1.12	Mode		0 B H
Set_Operation_Mode / 4.3.1.13	Mode		0 C H
Change_Slave_Address / 4.3.1.14	Address 1, address 2		0 D H
Read_Slave_Status / 4.3.1.15	Slave address	Error record of the slave	0 F H
Read Lists and Flags / 4.3.1.16	None	LES,LAS,LPS,flags	1 0 H
Read_Total_Configuration / 4.3.1.17		Actual configuration data, current parameters LAS, flags	1 9 H
Configuring the Total System / 4.3.1.18	Total configuration		1 A H
Write Parameter List / 4.3.1.19	List of parameters		1 C H
Read Parameter Echo List / 4.3.1.20	None	Parameter echo list	1 3 H
Read Version ID / 4.3.1.21	None	Version string	1 4 H
Slave Diagnostics / 4.3.1.22	Slave address	Error counter of the slaves	1 5 H
Read Slave Status and Delete / 4.3.1.23	Slave address	Error record of the slave	1 6 H
Read Slave ID / 4.3.1.24	Slave address	ID code	1 7 H
Read Slave I/O / 4.3.1.25	Slave address	I/O configuration	1 8 H
Read S1 Diagnostic Data / 4.3.1.26		List of slaves with different configurations	1 B H

Table 4-2 Overview of the Command Jobs

4.3.1.1 Set_Permanent_Parameter

Meaning

With this call, a parameter value for the specified slave is transferred to the CP 2430. The value is saved as a configured value in non-volatile memory.

The parameter is **not** transferred to the slave by the CP 2430 immediately. The parameter value is only transferred after a power up on the PLC when the slave is activated.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		0 H		Slave address			
KH:	0		Parameter					

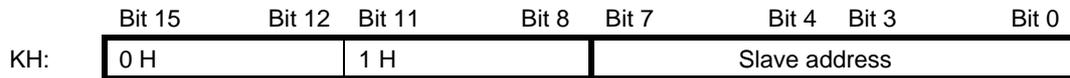
Number of data words (QLAE): 2

4.3.1.2 Get_Permanent_Parameter

Meaning

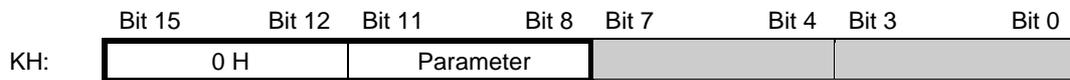
With this call, a slave-specific parameter value in the EEPROM of the CP 2430 is read.

Structure in the job DB



Number of data words (QLAE): 1

Structure in the response DB



4.3.1.3 Write_Parameter

Meaning

With this call, a parameter value is transferred and is sent directly via the AS-I bus to the addressed slave. The parameter is stored in temporary storage.

In the response, the slave returns the current parameter value. This can deviate from the values just written according to the AS-I master specification (/2/). The slave response is entered in the parameter echo field.

The RECEIVE job for "fetching" the parameter echo is optional. Normally the parameter echo is not evaluated in the S5 program.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		2 H		Slave address			
KH:	0		Parameter					

Number of data words (QLAE): 2

Structure in the response DB

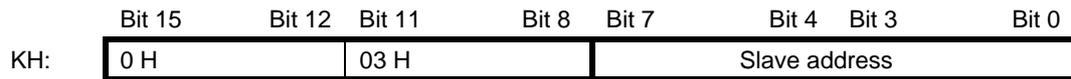
	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0		Parameter echo					

4.3.1.4 Read_Parameter

Meaning

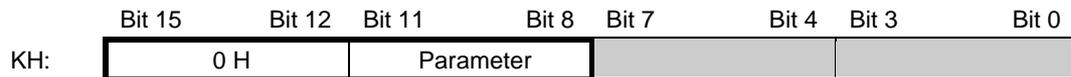
With this call, the current parameter value (actual parameter) of a slave is returned.

Structure in the job DB



Number of data words (QLAE): 1

Structure in the response DB



4.3.1.5 Store_Actual_Parameters

Meaning

With this call, the configured parameters in permanent storage are overwritten by the actual parameters, in other words the parameters are reconfigured.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		4 H					

Number of data words (QLAE): 1

4.3.1.6 Set_Permanent_Configuration

Meaning

With this call, the I/O configuration data and the ID code for the addressed AS-I slave are configured. The data are stored permanently on the AS-I master module.

☞ **When executing this command, the CP changes to the offline phase and then switches to the normal mode (cold restart on the CP).**

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0	
KH:	0 H		5 H			Slave address			
KH:	ID code		I/O configuration						

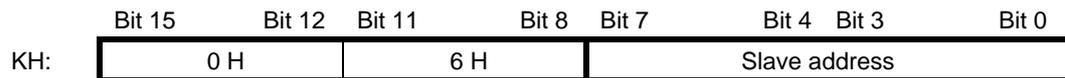
Number of data words (QLAE): 2

4.3.1.7 Get_Permanent_Configuration

Meaning

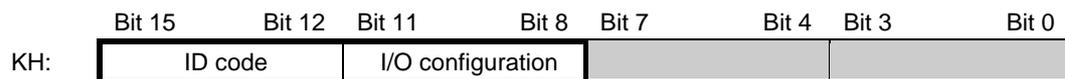
With this call, the desired configuration data stored in the EEPROM (I/O configuration data and the ID codes) of an addressed slave are returned.

Structure in the job DB



Number of data words (QLAE): 1

Structure in the response DB



4.3.1.8 Store_Actual_Configuration

Meaning

With this call, the actual I/O configuration data and actual ID codes of all slaves are saved permanently in the EEPROM as the desired configuration data. The list of active slaves (LAS) is also entered in the list of configured slaves (LPS).

 **When executing this command, the CP changes to the offline phase and then switches to the normal mode (cold restart on the CP).**

This call is **not** executed in the protected mode.

Structure in the job DB

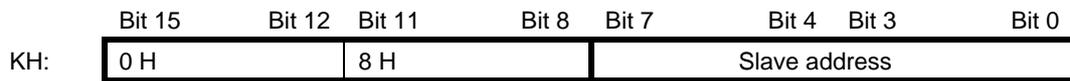
	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		7 H					

Number of data words (QLAE): 1

4.3.1.9 Read Actual Configuration Data

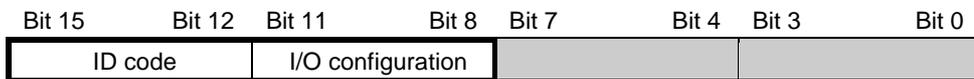
With this call, the actual I/O configuration data and actual ID codes of an addressed slave detected on the AS-I are returned.

Structure in the job DB



Number of data words (QLAE): 1

Structure in the response DB



4.3.1.10 Set_LPS

Meaning

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

 **When executing this command, the CP changes to the offline phase and then switches to the normal mode (cold restart on the CP).**

This call is **not** executed in the protected mode.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0								
KH:	0 H		9 H													
KH:	LPS slave 0..3		LPS slave 4..7		LPS slave 8..11		LPS slave 12..15									
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
KH:	LPS slave 16..19		LPS slave 20..23		LPS slave 24..27		LPS slave 28..31									

Number of data words (QLAE): 3

4.3.1.11 Set_Offline_Mode

Meaning

This call switches between the online and offline mode.

The OFFLINE bit is **not** permanently stored, i.e. during the startup/restart the bit is set to ONLINE again.

In the offline mode, the CP only processes jobs from the user. There is no cyclic data exchange.

The **online mode** is the normal situation with the AS-I master. Here, the following jobs are processed cyclically:

- During the data exchange phase, the fields of the output data are transferred to the slave outputs for all 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 slaves connected to the AS-I and newly added slaves are entered in the LDS or LAS.
- In the management phase, jobs from the user such as writing parameters are executed.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		A H		0 H		Mode (0=online 1=offline)	

Number of data words (QLAE): 1

4.3.1.12 Select Autoprogramming

Meaning

With this call, the automatic address programming function can be enabled or disabled.

The **AUTOADDRESS_ENABLE** bit is stored permanently.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		B H		0 H		Mode (1=Autoprog allowed 0=Autoprog disabled)	

Number of data words (QLAE): 1

⚠ Changing the **AUTOADDRESS_ENABLE** bit from 1 to 0 is effective immediately, changing the bit from 0 to 1 is only effective after the CP 2430 has changed to **OFFLINE**.

4.3.1.13 Set_Operation_Mode

With this call, you can select between the configuration mode and the protected mode.

In the **protected mode**, only slaves marked in the LPS and whose desired and actual configuration match are activated, in other words if the I/O configuration and the identification codes of the slaves in the LDS are identical to those of the configured values.

In the **configuration mode**, all detected slaves (except slave address "0") are activated. This also applies to slaves for which there is a difference between the desired and actual configuration. The OPERATION MODE bit is saved permanently in the EEPROM, i.e. it is retained following a start-up/warm restart.

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

If the address 0 is entered in the LDS for a slave, the CP cannot switch from the configuration mode to the protected mode.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		C H		0 H		Mode (0=protected mode 1=configuration mode)	

Number of data words (QLAE): 1

4.3.1.14 Change_Slave_Address

Meaning

With this call, the slave address can be changed.

This call is mainly used to add a new AS-I slave with the default address 0 to the SINEC S1 system. 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 *new slave address* must have a valid value.
4. No slave with the *new slave address* must already exist.

Note: When changing the slave address, the slave is not reset, in other words the output data of the slave are retained until new data arrive for the new address.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		D H		old slave address			
KH:	new slave address							

Number of data words (QLAE): 2

4.3.1.15 Read Slave Statun

Meaning

With this call, the status register of the addressed slave can be read out. The flags of the status register have the following significance:

- S0 “Address volatile”
This flag is set
- when the internal slave routine for permanent storage of the slave address is active. This can take up to 15 ms and must not be interrupted by a further addressing call.
- when the internal slave address comparison recognizes that the stored address is not the same as the entry in the address register.
- S1 “Parity error detected”
This flag is set when the slave has recognized a parity error in a received frame since the last “read and delete status” job.
- S2 “End bit error detected”
This flag is set when the slave has recognized an end bit error in a received frame since the last “read and delete status” job.
- S3 “Read error non-volatile memory”
This flag is set when a read error has occurred when reading the non-volatile memory.

Structure in the job DB

Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
0		F			Slave address		

Number of data words (QLAE): 1

Structure in the response DB

Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH: 0	Slave status S3 S2 S1 S0						

4.3.1.16 Read Lists and Flags (Get_LPS, Get_LAS, Get_LDS, Get_Flags)

Meaning

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

- the list of configured slaves
- the list of active slaves LAS
- the list of detected slaves LDS
- the flags according to the AS-I specification

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	1 H		0 H					

Number of data words (QLAE): 1

Structure in the response DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
	LAS slave 0..3		LAS slave 4..7		LAS slave 8..11		LAS slave 12..15	
	LAS slave 16..19		LAS slave 20..23		LAS slave 24..27		LAS slave 28..31	
	LDS slave 0..3		LDS slave 4..7		LDS slave 8..11		LDS slave 12..15	
	LDS slave 16..19		LDS slave 20..23		LDS slave 24..27		LDS slave 28..31	
	LPS slave 0..3		LPS slave 4..7		LPS slave 8..11		LPS slave 12..15	
	LPS slave 16..19		LPS slave 20..23		LPS slave 24..27		LPS slave 28..31	
	Flag1				Flag2			

Flag 1:

Name	Bit number
OFFLINE_READY	8
APF	9
NORMAL_MODE	10
CONFIG_MODE	11
AUTO_ADDR_AVAIL	12
AUTO_ADDR_ASSIGN	13
LES_0	14
CONFIG_OK	15

Flag 2:

Name	Bit number
OFFLINE	0
RESERVED	1
EEPROM_OK	2
AUT_ADDR_ENABLE	3
RESERVED	4
RESERVED	5
RESERVED	6
RESERVED	7

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 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 <u>one</u> slave is currently out of operation).
AUTO_ADDR_ASSIGN	This flag is set when the automatic address programming is possible (in other words <code>AUTO_ADDR_ENABLE = 1</code> <u>and</u> there is or was no "incorrect" slave connected to the AS-I cable).
LES_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 or disabled by the user (can be set with an HDB call).

4.3.1.17 Read Total Configuration

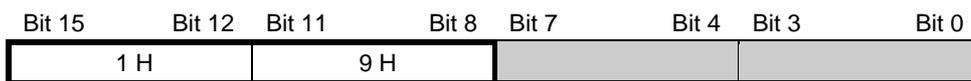
Meaning

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

- 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 SINEC S1 cable after installation. The configuration data that are read in can, if necessary, be modified and saved as the desired configuration on the CP 2430 using the command “configure total system” (see Section 4.3.1.18).

Structure in the job DB



Number of data words (QLAE): 1

Structure in the response DB

Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
LAS slave 0..3	LAS slave 4..7	LAS slave 8..11	LAS slave 12..15				
LAS slave 16..19	LAS slave 20..23	LAS slave 24..27	LAS slave 28..31				
ID code slave 0	I/O conf. slave 0	ID code slave 1	I/O conf. slave 1				
ID code slave 2	I/O conf. slave 2	ID code slave 3	I/O conf. slave 3				
ID code slave 4	I/O conf. slave 4	ID code slave 5	I/O conf. slave 5				
ID code slave 6	I/O conf. slave 6	ID code slave 7	I/O conf. slave 7				
ID code slave 8	I/O conf. slave 8	ID code slave 9	I/O conf. slave 9				
ID code slave 10	I/O conf. slave 10	ID code slave 11	I/O conf. slave 11				
ID code slave 12	I/O conf. slave 12	ID code slave 13	I/O conf. slave 13				
ID code slave 14	I/O conf. slave 14	ID code slave 15	I/O conf. slave 15				
ID code slave 16	I/O conf. slave 16	ID code slave 17	I/O conf. slave 17				
ID code slave 18	I/O conf. slave 18	ID code slave 19	I/O conf. slave 19				
ID code slave 20	I/O conf. slave 20	ID code slave 21	I/O conf. slave 21				
ID code slave 22	I/O conf. slave 22	ID code slave 23	I/O conf. slave 23				
ID code slave 24	I/O conf. slave 24	ID code slave 25	I/O conf. slave 25				
ID code slave 26	I/O conf. slave 26	ID code slave 27	I/O conf. slave 27				
ID code slave 28	I/O conf. slave 28	ID code slave 29	I/O conf. slave 29				
ID code slave 30	I/O conf. slave 30	ID code slave 31	I/O conf. slave 31				
	Parameter slave 1	Parameter slave 2	Parameter slave 3				
Parameter slave 4	Parameter slave 5	Parameter slave 6	Parameter slave 7				
Parameter slave 8	Parameter slave 9	Parameter slave 10	Parameter slave 11				
Parameter slave 12	Parameter slave 13	Parameter slave 14	Parameter slave 15				
Parameter slave 16	Parameter slave 17	Parameter slave 18	Parameter slave 19				
Parameter slave 20	Parameter slave 21	Parameter slave 22	Parameter slave 23				
Parameter slave 24	Parameter slave 25	Parameter slave 26	Parameter slave 27				
Parameter slave 28	Parameter slave 29	Parameter slave 30	Parameter slave 31				
Flag 1				Flag2			

Flag 1

Name	Bit number
OFFLINE_READY	0
APF	1
NORMAL_MODE	2
CONFIG_MODE	3
AUTO_PROG_AVAIL	4
AUTO_PROG	5
LES_0	6
CONFIG_OK	7

Flag 2

Name	Bit number
OFFLINE	0
RESERVED	1
EEPROM_OK	2
AUTO_ADDR_EN	3
RESERVED	4
RESERVED	5
RESERVED	6
RESERVED	7

The meaning of the flags is the same as for the read lists and flags job(Get_LPS, Get_LAS, Get_LDS, Get_Flags), see Section 4.3.1.16.

4.3.1.18 Configuring the Total System

Meaning

With this call, the desired total configuration is transferred to the CP 2430 and saved on the CP 2430 as the desired configuration. This configures the CP 2430.

The following data are transferred:

- The list of configured slaves specifying the slaves that can be activated by the CP 2430 in the protected mode.
- The list of configuration data specifying the ID codes and I/O configurations the slaves must have.
- The list of parameters saved in non-volatile memory on the CP. This is transferred to the slaves during the start up of the CP 2430.
- The flags that determine the mode of the CP 2430 after start up (in other words after the CP 2430 has been synchronized).

Structure in the job DB

Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
1	A						
LPS slave 0..3	LPS slave 4..7	LPS slave 8..11	LPS slave 12..15				
LPS slave 16..19	LPS slave 20..23	LPS slave 24..27	LPS slave 28..31				
ID code slave 0	I/O conf. slave 0	ID code slave 1	I/O conf. slave 1				
ID code slave 2	I/O conf. slave 2	ID code slave 3	I/O conf. slave 3				
ID code slave 4	I/O conf. slave 4	ID code slave 5	I/O conf. slave 5				
ID code slave 6	I/O conf. slave 6	ID code slave 7	I/O conf. slave 7				
ID code slave 8	I/O conf. slave 8	ID code slave 9	I/O conf. slave 9				
ID code slave 10	I/O conf. slave 10	ID code slave 11	I/O conf. slave 11				
ID code slave 12	I/O conf. slave 12	ID code slave 13	I/O conf. slave 13				
ID code slave 14	I/O conf. slave 14	ID code slave 15	I/O conf. slave 15				
ID code slave 16	I/O conf. slave 16	ID code slave 17	I/O conf. slave 17				
ID code slave 18	I/O conf. slave 18	ID code slave 19	I/O conf. slave 19				
ID code slave 20	I/O conf. slave 20	ID code slave 21	I/O conf. slave 21				
ID code slave 22	I/O conf. slave 22	ID code slave 23	I/O conf. slave 23				
ID code slave 24	I/O conf. slave 24	ID code slave 25	I/O conf. slave 25				
ID code slave 26	I/O conf. slave 26	ID code slave 27	I/O conf. slave 27				
ID code slave 28	I/O conf. slave 28	ID code slave 29	I/O conf. slave 29				
ID code slave 30	I/O conf. slave 30	ID code slave 31	I/O conf. slave 31				
	Parameters slave 1	Parameters slave 2	Parameters slave 3				
Parameters slave 4	Parameters slave 5	Parameters slave 6	Parameters slave 7				
Parameters slave 8	Parameters slave 9	Parameters slave 10	Parameters slave 11				
Parameters slave 12	Parameters slave 13	Parameters slave 14	Parameters slave 15				
Parameters slave 16	Parameters slave 17	Parameters slave 18	Parameters slave 19				
Parameters slave 20	Parameters slave 21	Parameters slave 22	Parameters slave 23				
Parameters slave 24	Parameters slave 25	Parameters slave 26	Parameters slave 27				
Parameters slave 28	Parameters slave 29	Parameters slave 30	Parameters slave 31				
Flag 1				Flag 2			

Flag 1

Name	Bit number
OFFLINE_READY	0
APF	1
NORMAL_MODE	2
CONFIG_MODE	3
AUTO_PROG_AVAIL	4
AUTO_PROG	5
LES_0	6
CONFIG_OK	7

Flag 2

Name	Bit number
OFFLINE	0
RESERVED	1
EEPROM_OK	2
AUTO_ADDR_EN	3
RESERVED	4
RESERVED	5
RESERVED	6
RESERVED	7

Number of data words (QLAE): 28

The value of the gray shaded flags can change the mode of the CP 2430:

CONFIG_MODE The entry '0' means that the CP 2430 starts up in the protected mode after synchronization. The entry '1' means that the CP starts up in the configuration mode.

AUTO_ADDR_EN '0' means that the automatic address programming is disabled, '1' means that the automatic address programming is enabled.

The values of the other flags are irrelevant for the "configure total system" command.

4.3.1.19 Write Parameter List

Meaning

With this command, the parameters for all slaves are transferred to the CP 2430. The CP 2430 transfers **only** the parameters that have changed to the slaves, in other words that deviate from the current actual parameters.

Structure in the job DB

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

Number of data words (QLAE): 9

4.3.1.20 Read Parameter Echo List

Meaning

This call takes into account possible future extensions of the AS-I function.

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

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	1 H		3 H					

Number of data words (QLAE): 1

Structure in the response DB

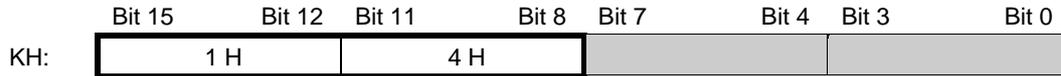
	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:		Par.echo slave 1		Par.echo slave 2		Par.echo slave 3		
KH:	Par.echo slave 4		Par.echo slave 5		Par.echo slave 6		Par.echo slave 7	
KH:	Par.echo slave 8		Par.echo slave 9		Par.echo slave 10		Par.echo slave 11	
KH:	Par.echo slave 12		Par.echo slave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

4.3.1.21 Read Version ID

Meaning

With this call, the version ID of the AS-I master software is read out.

Structure in the job DB



Number of data words (QLAE): 1

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

Structure in the response DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KS:		S					i	
KS:		e					m	
KS:		e					n	
KS:		s						
KS:		A					G	
KS:							C	
KS:		P						
KS:		2					4	
KS:		3					0	
KS:								
KS:								
KS:		V						
KS:		x					.	
KS:		y					y	

x.yy stands for the current version number.

4.3.1.22 Slave Diagnostics

Meaning

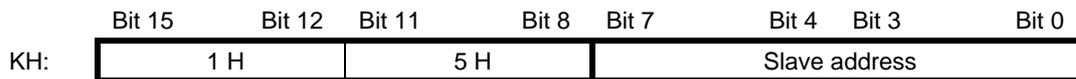
This command returns the number of AS-I errors that occurred in conjunction with a slave. With this call, the error counter is then deleted.

The value of the error counter is incremented in the following situations:

- When a slave does not reply correctly during the data exchange phase despite repeating the master frame (i.e. missing or incorrect slave frame).
- With slaves that have not been activated, the error counter is incremented when a slave has already been detected (i.e. it exists in the LDS) but then no longer correctly replies.

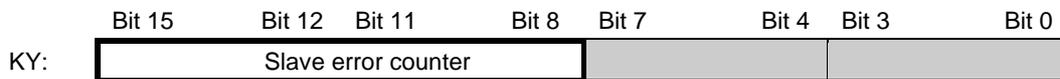
The error counter is incremented to a maximum value of 255 and then remains at this value until deleted.

Structure in the job DB



Number of data words (QLAE): 1

Structure in the response DB



4.3.1.23 Read Slave Status and Delete

Meaning

With this call, the status of a slave is read out and at the same time the status register of the slave is deleted.

The flags of the status register have the following meaning:

- S0 "Address volatile"
This flag is set
- when the internal slave routine for permanent storage of the slave address is active. This can take up to 15 ms and must not be interrupted by a further addressing call.
- when the internal slave address comparison recognizes that the stored address is not the same as the entry in the address register.
- S1 "Parity error detected"
This flag is set when the slave has recognized a parity error in a received frame since the last "read and delete status" job.
- S2 "End bit error detected"
This flag is set when the slave has recognized an end bit error in a received frame since the last "read and delete status" job.
- S3 "Read error non-volatile memory"
This flag is set when a read error has occurred when reading the non-volatile memory.

Structure in the job DB

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	1 H		6 H		Slave address			

Number of data words (QLAE): 1

Structure in the response DB

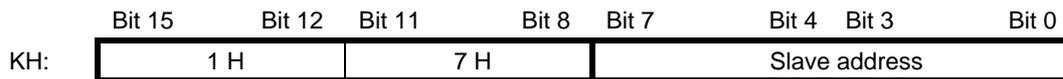
	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
KH:	0 H		Slave status					

4.3.1.24 Read Slave ID

Meaning

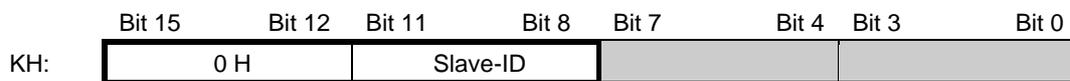
With this call, the ID code of a slave can be read out directly over the AS-I cable. The call is intended for diagnostic purposes and is not required in the normal master mode.

Structure in the job DB



Number of data words (QLAE): 1

Structure in the response DB

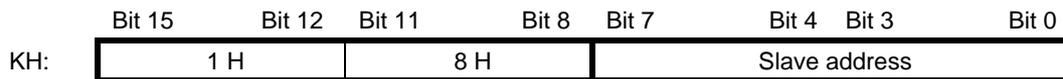


4.3.1.25 Read Slave I/O

Meaning

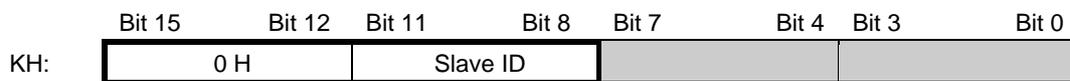
With this call, the I/O configuration of a slave can be read out directly over the AS-I cable. The call is intended for diagnostic purposes and is not required in the normal master mode.

Structure in the job DB



Number of data words (QLAE): 1

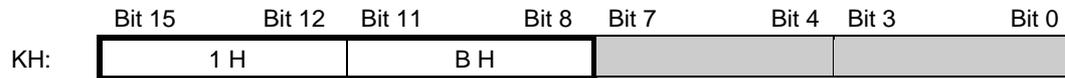
Structure in the response DB



4.3.1.26 Read S1 Diagnostic Data

Meaning:

Structure in the job DB



Number of data words (QLAE): 1

Structure in the error information field of the CP

Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
Disc.slave 0-3		Disc.slave 4-7		Disc.slave 8-11		Disc.slave 12-15	
Disc.slave 16-19		Disc.slave 20-23		Disc.slave 24-27		Disc.slave 28-31	

- List of slaves with configuration discrepancies.
Each bit corresponds to exactly one slave.
Bit = 1 means that the slave differs from the set configuration.

4.4 Transferring I/O Data of the AS-I Slaves Using HDBs (Only Mode 3, ANR 200, 201)

If mode 3 is set for a channel of the CP 2430, this means switch PM = ON and switch IO = OFF, the I/O data for the individual AS-I slaves are not transferred on the I/O interface but using the page interface. In this case, this channel does not use any I/O address area.

4.4.1 Transferring the Output Data to the AS-I Slaves (ANR 200)

The output data of the slaves are transferred to the CP 2430 using a SEND call with job number 200. With the SEND call, 16 bytes must always be transferred, in other words the output data for all slaves are transferred to the CP 2430. The output data is generally transferred at the end of the cycle, this can, however, take place at any point in the PLC cycle (OB1).

If you use a data block (parameter QTYP = 'DB') as the data source, the following table shows how the output data of the slaves are stored in the data block.

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

QLAE = 8

A timeout as in the I/O mode cannot be set.

4.4.2 Reading the Input Data of the AS-I Slaves (ANR 201)

The input data of the slaves are read from the CP 2430 using a RECEIVE job with job number 201.

With this RECEIVE job, the CP 2430 always returns 16 bytes containing the input data of the AS-I slaves. The following table shows the assignment of the input data to the individual AS-I slaves if a data block is being used as the data destination (parameter ZTYP = 'DB').

	Bit 15	Bit 12	Bit 11	Bit 8	Bit 7	Bit 4	Bit 3	Bit 0
ZANF:	Status nibble		Slave 1		Slave 2		Slave 3	
	Slave 4		Slave 5		Slave 6		Slave 7	
	Slave 8		Slave 9		Slave 10		Slave 11	
	Slave 12		Slave 13		Slave 14		Slave 15	
	Slave 16		Slave 17		Slave 18		Slave 19	
	Slave 20		Slave 21		Slave 22		Slave 23	
	Slave 24		Slave 25		Slave 26		Slave 27	
	Slave 28		Slave 29		Slave 30		Slave 31	

ZLAE = 8

Status Nibble

The status nibble has the same meaning as in the standard mode.

	Bit 7	Bit 6	Bit 5	Bit 4
Meaning	0 = Voltage on the AS-I cable is OK 1 = An ASI Power Fail has occurred. The data are invalid	0 = No error 1 = Configuration error	0 = Startup active 1 = CP startup completed	0 = CP in protected mode 1=CP in configuration mode

Table 4-3 Assignment of the Status Nibble

Bit 7 "ASI Power Fail" This bit indicates whether or not the power supply on the AS-I cable is OK, too low or has failed completely.

If the voltage is incorrect or has failed the input data of all slaves are set to 0.

Bit 6 "Config Error" This bit indicates whether the configuration saved on the master matches the configuration of the slaves connected to the AS-I cable.

If the configurations do not match, the input data of missing or failed slaves are set to 0.

Bit 5 "Startup Bit" This bit indicates to the PLC whether or not the CP 2430 has completed its startup and internal initialization. This bit must be tested by the PLC during startup for the actual PLC program can be started.

Bit 4 "Mode" This bit indicates whether the CP 2430 is in the configuration mode or in the protected mode. This bit can, for example, be used to configure the CP 2430 (see example program).

5. Multiprocessor Mode

The CP 2430 can also be used in multiprocessor PLCs. If possible, one channel of the CP 2430 should be assigned exclusively to an S5 CPU. In this case, there are no restrictions.

If a channel of the CP 2430 is addressed by several S5 CPUs at the same time, the following conditions should be taken into account:

Multiprocessor Mode Using the I/O Interface of the CP 2430

If the S5 CPU accesses the I/O interface of the CP 2430, the same restrictions apply as for digital input and output modules. This means that inputs can be read by all CPUs. An output must, however, only be used exclusively by one CPU.

Multiprocessor Mode Using the Page Interface of the CP 2430

If several S5 CPUs access the same page interface using handling blocks, they coordinate the access themselves.

The following points should however be noted with respect to the PLC user programs:

- When the SEND/RECEIVE direct block is run with RLO = 1, PAFE = 81h can occur (interface occupied by a different CPU). In this case the HDB run was not successful (no data transfer).
- Since the same SSNR/ANR combinations can be used in different CPUs, the status word of a job can change from the point of view of a program without the program itself being responsible for the change (for example due to a job being triggered on a different CPU).
- The SEND job with ANR 200 that transfers output data for the AS-I slaves must only be used by **one** S5 CPU.
- When handling a management function with ANR 202, it is possible that a management function was triggered by CPU X using SEND direct, the result of the function (for example an ID code that has been read out) can, however only be fetched by a different CPU Y using the RECEIVE direct. The CP 2430 does not have any interlock mechanisms for such situations. The user programs must recognize such situations by appropriate programming.

6. Replacing a Defective Slave / Automatic Address Programming

If the indicator AUPRG is lit in the protected mode of the CP 2430, it indicates the following:

- Exactly **one** slave has failed.
- Automatic address programming by the CP 2430 is possible.

You can now replace the defective slave as follows:

- ✓ Remove the failed slave from the AS-I cable. You can identify the failed slave simply by the dot of the failed slave flashing in the matrix display.
- ✓ Replace the defective slave with an identical slave with address 0 (as supplied). The CP 2430 then programs this slave with the address of the original station that had failed.

The "AUPRG" indicator then goes off. The CP 2430 indicates the new slave in the LED display of the "ACTIVE SLAVES".

 **Note that “automatic address programming” is only possible when the CP 2430 is in the protected mode and when only one slave has failed.**

 **If a non-configured slave was connected to SINEC S1, the “automatic address programming” is disabled by the CP until:**

1. The “incorrect slave” is removed and
2. The CP goes through a cold restart (AS-I power on and off or S5 power on and off).

The following table lists the possible causes of errors that can occur during “automatic address programming” and how to remedy the problem.

Error	Mögliche Ursache	Remedy
After a slave fails, the "AUPRG " indicator remains off.	The CP is in the configuration mode.	“Automatic programming” is not possible in the configuration mode. The address of the new slave must be programmed with the address programming unit.
	More than one slave has failed (check "ACTIVE SLAVES" indicators).	Check AS-I cable. If “APF” is indicated at the same time, check the power supply to the AS-I cable. If more than one slave is defective, the addresses of the replacement slaves must be programmed with the address programming unit.
	The CP has detected unconfigured slaves.	Remove unconfigured slaves from the AS-I cable. Reset the CP by setting "RUN"- "STOP"-RUN" on the PLC.
Automatic address programming not done although the "AUPRG" is lit.	The configuration data (I/O configuration, ID code) of the replacement slave do not match the values of the original slaves.	Check whether the correct replacement slave was used. Compare the vendor's information with the configuration data. If you want to replace the original slave with a different type, the address must be assigned with the address programming unit and the CP 2430 re-configured using the switches.
	Replacement slave does not have the address “zero”.	Set the address of the replacement slave with the address programming unit.
	Replacement slave not correctly connected or defective.	Check the connections of the slave; if necessary, replace the slave.

Table 6-1 Causes of Errors and Remedy with Automatic Address Programming

7. Error Indicators on the CP 2430 / Dealing with Problems

The following table lists the possible causes of problems when operating the CP 2430 and how to remedy the problem.

Error	Possible cause	Remedy
S1 PF - indicator lit.	The AS-I power supply unit is not connected or is defective.	Check the connection of the AS-I power supply unit; if necessary replace the power supply unit.
	Power requirements of the AS-I slave too high (total current greater than 2A).	Check the power requirements of the AS-I station. If necessary, supply the slaves with power externally.
FAULT LED lit continuously.	CP 2430 defective	Replace the CP 2430
FAULT LED lights up when the mode selector is pressed.	You want to change to the protected mode but a slave with address 0 exists.	Remove the slave with address 0 from the AS-I cable or program an address with the addressing unit and then run a PLC cold restart.
	The mode selector was set to SET CONFIG in the protected mode.	Switch the CP to CHMD with the mode selector and then to SCFG.
CERR indicator lights up.	The CP 2430 is not yet configured.	Configure the CP with the mode selector on the front panel.
	A configured slave has failed (evaluate the "ACTIVE SLAVES" indicator).	Replace the defective slave or if the slave is not required, re-configure the CP 2430.
	An unconfigured slave was connected to the AS-I cable.	Remove the slave or re-configure the CP 2430.
	A slave has been connected whose configuration data (I/O configuration, ID code) do not match the value of the configured slave.	Check whether an incorrect slave has been connected. If necessary, re-configure the CP 2430.
CERR indicator flickers, meaning that a configured slave drops out sporadically.	Bad contact.	Check the connections of the AS-I slave.
	Interference on the AS-I cable.	Make sure the PLC is correctly grounded and check along the AS-I cable.

Error indicators (continued)

Error	Possible cause	Remedy
CP does not switch from the configuration mode to the protected mode.	The PLC is in the "RUN" mode.	Switch the PLC to "STOP".
	Selector not activated long enough.	Make sure the selector is activated for 0.5 s.
	A slave with the address 0 is connected to the AS-I cable. The CP 2430 cannot switch over to the protected mode as long as this slave exists.	Remove the slave with address 0.
CP does not switch from the protected mode to the configuration mode.	The PLC is in the "RUN" mode.	Switch the PLC to "STOP".
	Button not activated long enough.	Make sure the selector is activated for 0.5 s.

Table 7-1 Error Indications in Standard Operation

A ASI Protocol Implementation Conformance Statement (PICS)

A.1 PICS for the CP 2430

Vendor	Siemens AG
Product Name	CP 2430 - SINEC S1 master module for S5-115U, S5-135U and S5-155U
Order Number	6GK1243-0SA00
Version	1
Master Profile	M1 with handling blocks, M0 without handling blocks
Date	29. Aug. 1995

List of Master Functions Available with Handling Blocks

No.	Function or Call on the Host Interface (symbolic representation)	M1	Comment / Function implemented by / Section
1	Image, Status = Read_IDI()	X	By the controller accessing the I/O interface of the CP 2430 (for example using the PII) Using a SEND job with ANR 200
2	Status = Write_ODI(Image)	X	By the controller accessing the I/O interface of the CP 2430 (for example using the PIQ) Using a RECEIVE job with ANR 201
3	Status = Set_Permanent_Parameter(Addr, Param)	X	4.3.1.1
4	Param, Status = Get_Permanent_Parameter(Addr)	X	4.3.1.2
5	Status, GParam = Write_Parameter(Addr, Param)	X	4.3.1.3
6	Status, Param = Read_Parameter(Addr)	X	4.3.1.4
7	Status = Store_Actual_Parameters()	X	4.3.1.5.
8	Status = Set_Permanent_Configuration(Addr, Config)	X	4.3.1.6
9	Status, Config = Get_Permanent_Configuration(Addr)	X	4.3.1.7
10	Status = Store_Actual_Configuration()	X	4.3.1.8. This command also triggers a cold restart on the CP.
11	Status, Config = Read_Actual_Configuration(Addr)	X	4.3.1.9
12	Status = Set_LPS(List31)	X	4.3.1.10
13	Status, List31 = Get_LPS()	X	Read lists and flags / 4.3.1.16

14	Status, List31 = Get_LAS()	X	Read lists and flags / 4.3.1.16
15	Status, List32 = Get_LDS()	X	Read lists and flags / 4.3.1.16
16.0	Status = Get_Flags()	X	Read lists and flags / 4.3.1.16
16.1	Status, Flag = Get_Flag_Config_OK()	X	CP error bit, LED display Read lists and flags / 4.3.1.16
16.2	Status, Flag = Get_Flag_LDS.0()	X	Read lists and flags / 4.3.1.16
16.3	Status, Flag = Get_Flag_Auto_Address_Assign()	X	Read lists and flags / 4.3.1.16
16.4	Status, Flag = Get_Flag_Auto_Prog_Available()	X	Read lists and flags / 4.3.1.16
16.5	Status, Flag = Get_Flag_Configuration_Active()	X	Read lists and flags / 4.3.1.16
16.6	Status, Flag = Get_Flag_Normal_Operation_Active()	X	Read lists and flags / 4.3.1.16
16.7	Status, Flag = Get_Flag_APF()	X	CP error bit, LED display Read lists and flags / 4.3.1.16
16.8	Status, Flag = Get_Flag_Offline_Ready()	X	Read lists and flags / 4.3.1.16
17	Status = Set_Operation_Mode(Mode)	X	4.3.1.13
18	Status = Set_Offline_Mode(Mode)	X	4.3.1.11
19	Status = Activate_Data_Exchange(Mode)	-	not implemented
20	Status = Change_Slave_Address(Addr1, Addr2)	X	4.3.1.14
21	Status = Set_Auto_Address_Enable	X	4.3.1.12
22	Status = Get_Auto_Address_Enable	X	Read lists and flags / 4.3.1.16

Nr.	Function or Call on the Host Interface (symbolic representation)	M1	Comment / Function implemented by / Section
23.1	Status, Resp = Cmd_Reset_ASI_Slave(Addr, RESET)	-	not implemented
23.2	Status, Resp = Cmd_Read_IO_Configuration(Addr, CONF)	X	4.3.1.25
23.3	Status, Resp = Cmd_Read_Identification_Code(Addr, IDCOD)	X	4.3.1.24
23.4	Status, Resp = Cmd_Read_Status(Addr, STAT)	X	4.3.1.15
23.5	Status, Resp = Cmd_Read_Reset_Status(Addr, STATRES)	X	4.3.1.23

List of Master Functions Available Without Handling Blocks

Nr.	Function or Call on the Host Interface (symbolic representation)	M0	Comment / Function implemented by / Section
1	Image, Status = Read_IDI()	X	By the controller accessing the I/O interface of the CP 2430 (for example using the PII)
2	Status = Write_ODI(Image)	X	By the controller accessing the I/O interface of the CP 2430 (for example using the PIQ)
3	Status = Set_Permanent_Parameter(Addr, Param)	-	not implemented
4	Param, Status = Get_Permanent_Parameter(Addr)	-	not implemented
5	Status, GParam = Write_Parameter(Addr, Param)	-	not implemented
6	Status, Param = Read_Parameter(Addr)	-	not implemented
7	Status = Store_Actual_Parameters()	-	not implemented
8	Status = Set_Permanent_Configuration(Addr, Config)	-	not implemented
9	Status, Config = Get_Permanent_Configuration(Addr)	-	not implemented
10	Status = Store_Actual_Configuration()	X	By switches on the front panel
11	Status, Config = Read_Actual_Configuration(Addr)	-	not implemented
12	Status = Set_LPS(List31)	-	not implemented
13	Status, List31 = Get_LPS()	-	not implemented
14	Status, List31 = Get_LAS()	-	not implemented
15	Status, List32 = Get_LDS()	-	not implemented
16.0	Status = Get_Flags()	-	not implemented

16.1	Status, Flag = Get_Flag_Config_OK()	X	CP error bit, LED display on front panel
16.2	Status, Flag = Get_Flag_LDS.0()	-	not implemented
16.3	Status, Flag = Get_Flag_Auto_Address_Assign()	-	not implemented
16.4	Status, Flag = Get_Flag_Auto_Prog_Available()	-	not implemented
16.5	Status, Flag = Get_Flag_Configuration_Active()	-	not implemented
16.6	Status, Flag = Get_Flag_Normal_Operation_Active()	-	not implemented
16.7	Status, Flag = Get_Flag_APF()	X	CP error bit, LED display on front panel
16.8	Status, Flag = Get_Flag_Offline_Ready()	-	not implemented
17	Status = Set_Operation_Mode(Mode)	X	Switch on front panel of the CP
18	Status = Set_Offline_Mode(Mode)	-	not implemented
19	Status = Activate_Data_Exchange(Mode)	-	not implemented
20	Status = Change_Slave_Address(Addr1, Addr2)	-	not implemented
21	Status = Set_Auto_Address_Enable	X	4.3.1.12
22	Status = Get_Auto_Address_Enable	X	Read lists and flags / 4.3.1.16
23.1	Status, Resp = Cmd_Reset_ASI_Slave(Addr, RESET)	-	not implemented
23.2	Status, Resp = Cmd_Read_IO_Configuration(Addr, CONF)	-	not implemented
23.3	Status, Resp = Cmd_Read_Identification_Code(Addr, IDCOD)	-	not implemented
23.4	Status, Resp = Cmd_Read_Status(Addr, STAT)	-	not implemented
23.5	Status, Resp = Cmd_Read_Reset_Status(Addr, STATRES)	-	not implemented

Key to column 3

Symbol	Meaning
X	Function exists
-	Function does not exist

ASI Cycle Time Related to the Number of Connected Slaves

The maximum cycle time is ≤ 5 ms for 31 Slaves. This maximum time is hardly reduced if less slaves are connected.

B Status Word ANZW and Parameter Assignment Error Byte PAFE

Overview

The CP 2430 signals the status of each job (permitted job numbers ANR 200, 201, 202) and any error codes that occur, as follows:

- Using the status word ANZW (information about job processing)
- Using the parameter assignment error byte PAFE (indicates incorrect job parameter assignment).

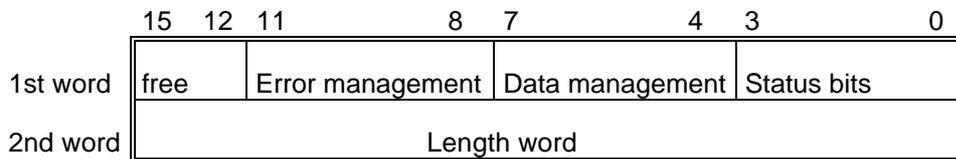
B.1 Meaning and Structure of the ANZW

The status word contains the processing status of each job. A separate job number must be used in the S5 user program for each job number used on the CP 2430.

The status word must be evaluated immediately after the handling block has been run.

Structure of the ANZW

The status word consists of the actual status word (first word) and a length word (second word). It has the following basic structure:



Meaning of the Length Word

The handling blocks (SEND, RECEIVE) enter the number of data words transferred for the job in the length word.

Explanation

The following sections explain how to handle the status bits. For each bit, you will see how the bit is set, how the bit is reset (deleted) and which analysis is useful. The assignment of the bits is explained in the explanation of the nibbles.

B.2 Content of the Status Word

- Nibble 1, bits 0 to 3, status bits of the job:
These bits indicate whether a job has already started, whether errors have occurred or whether the job is disabled, for example because the wrong mode is set.
- Nibble 2, bits 4 to 7, data management of the job:
These bits indicate whether the data transfer for the job is still active or whether the data transfer or data acceptance for the job has already been completed. With the “Enable/Disable” bit, the data transfer for the job can be disabled. (Disable = 1; Enable = 0). The “Enable/Disable” function is not required for the CP 2430 and the bit is always set to “Enable”.
- Nibble 3, bits 8 to 11, error bits of the job:
Any errors that have occurred in the job are indicated in these bits. These error bits are only valid when the bit “job complete with error” is set in the status nibble.
- Nibble 4, bits 12 to 15:
These bits are reserved for expansions.

Meaning of the Bits in the Status Word

a) Bit 0: Receive possible

Set: By the handling blocks. Receive possible (=1) is set by the RECEIVE block and indicates that data can be fetched from the CP 2430 using the appropriate RECEIVE job.

Reset: By the handling blocks, after the RECEIVE has been processed.

Analysis: By the RECEIVE block: The RECEIVE block only initiates the data exchange with the CP when this bit is set.

By the application: The application can check whether data for the job can be fetched from the CP 2430.

b) Bit 1: Job active/SEND disabled

Set: By the handling blocks, when the job is sent to the CP.

Reset: By the handling blocks, when a new SEND job can be triggered.

Analysis: By the SEND block: A new SEND job is only processed when the previous SEND job has been completed.

By the user: To find out whether it is possible to trigger a new job.

c) Bit 2: Job completed without error

Set: By the handling blocks, when the corresponding job was completed without an error.

Reset: By the handling blocks, when the job is triggered again.

Analysis: By the user: To check whether the job was completed without errors.

d) Bit 3: Job completed with error

Set: By the handling blocks, when the corresponding job was completed with an error. The cause of the error is then coded in the high part of the status word.

Reset: By the handling blocks, when the job is triggered again.

Analysis: By the user: To check whether the job was completed with an error. If the identifier "job completed with error" is set, the cause of the error is located in the high byte (error management) of the status word.

e) Bit 4: Data acceptance/data transfer active

Set: By the SEND/RECEIVE handling blocks, when the transfer/acceptance of data has started (the bit is only set when larger volumes of data are transferred. On the CP 2430, this bit is always "0").

Reset: By the SEND, RECEIVE handling blocks, when the data exchange for a job is completed.

Analysis: The analysis of this bit is not necessary on the CP 2430 since the data transfer/data acceptance takes place in one block run through. This bit is always set to "0" for the user.

f.) Bit 5: Data transfer successful

Set: By the SEND handling block when the data transfer for a job was successful.

Reset: Reset by the SEND handling block when the data transfer for a newly triggered job starts.

By the user when the bit has been evaluated (signal edge).

Analysis: By the user: With this bit, the user can find out whether the data record for a job has already been transferred to the CP or when a new data record can be made available for the current job.

g.) Bit 6: Data acceptance successful

Set: By the RECEIVE handling block when the data for a job were accepted successfully.

Reset: By the RECEIVE handling block when the transfer of data to the PLC has started for a newly triggered job.

By the user when the evaluation is completed (signal edge).

Analysis: By the user: With this bit, the user can find out whether the data record of a job has already been transferred to the PLC.

h.) Bit 7: Disable/Enable data field

Set: By the user to prevent an area being written to by the RECEIVE block or an area being read out by the SEND block.

Reset: By the user to enable the data area in question.

Analysis: By the SEND and RECEIVE handling blocks. If bit 7 is set, the blocks do not transfer data but signal the error to the CP.

Note: When operating the CP 2430, this bit must always be set to ENABLE (= 0).

i) Bits 8 to 11: Error nibble:

If the CP enters an error identifier in the job status (for example job completed with error), the handling blocks enter an error ID in the error nibble. This error ID is explained in detail in the following section.

j) Bits 12 to 15:

These bits are reserved for later expansions.

Error Nibble

The following section explains the meaning of the error nibble of the status word and the possible remedies. The errors are as follows:

- 0 to 5 are errors detected by the HDB
- 6 to F are errors signaled by the CP 2430

All the possible errors are listed in the following table:

0h	Cold restart (Synchron)	
1h	Source/destination parameters invalid	<ul style="list-style-type: none"> • The HDB has detected invalid values for the source/destination parameters. • The user has disabled data transfer with bit 7 in the status word.
2h	Area does not exist on PLC	<ul style="list-style-type: none"> • When the job was triggered, a data block, for example, was specified as the DBNR that does not exist on the PLC.
3h	Area on PLC too small	<ul style="list-style-type: none"> • The total of Q/ZANF and Q/ZLAE exceeds the area limit.
4h	Timeout on PLC	<ul style="list-style-type: none"> • The Q/Z parameters specified an area (for example AS, PB or similar) that is not equipped with memory or is defective.
5h	Error in the status word	<ul style="list-style-type: none"> • The specified ANZW cannot be processed.
6h	Source/destination parameters not supported by CP	<ul style="list-style-type: none"> • Q/ZTYP has an identifier not supported by the CP 2430 (for example NN, RW) • With ANR 200: QLAE is not 16 bytes • With ANR 202 : Length is less than expected
7h	Listen error	<ul style="list-style-type: none"> • The addressed slave is not in the LAS
8h	Job not permitted in the current status of the CP 2430	<ul style="list-style-type: none"> • A management call was triggered in the incorrect status (for example "configure ID code" while the CP is in the protected mode).
9h	SND_ERROR	<ul style="list-style-type: none"> • Address invalid (= 0 or > 31) • Change slave address: Old slave address not recognized

Ah	SD0_ERROR	<ul style="list-style-type: none"> • Change slave address: Slave with address 0 already exists. • Set protected mode: Slave 0 exists
Bh	SD2_ERROR	<ul style="list-style-type: none"> • Change slave address: New slave address already exists.
Ch	DE_ERROR	<ul style="list-style-type: none"> • Change slave address: Error deleting the slave address.
Dh	SE_ERROR	<ul style="list-style-type: none"> • Change slave address: Error setting the new slave address • EEPROM ERROR • Incorrect slave response three times from AS interface (e.g. timeout, parity error etc.)
Eh	AT_ERROR	<ul style="list-style-type: none"> • Change slave address: Address only temporarily stored
Fh	Job number or function code unknown	<ul style="list-style-type: none"> • ANR 200/201: Data exchange via inputs outputs set on CP. • ANR 202: Wrong function ID in byte 0 of the transmit data • ANR 202: Wrong parameter values (byte values in bits: For example set OFFLINE with MODE = 2 or higher)

B.3 Possible Status Words With the Jobs Permitted on the CP 2430

Exchange of AS-I parameters, management and diagnostic information with ANR 202 (SEND and RECEIVE)

With communication using ANR 202, two different situations must be distinguished:

First situation: Job without acknowledgment data (for example set_LPS)

In this case, the function code and any management data are transferred with the SEND direct (ANR 202). The transfer of the data is acknowledged by the CP. There is no subsequent RECEIVE call.

Possible status words (error-free sequence)

ANZW (hex)	Remarks
000A 0000	After SYNCHRON: Send and Receive disabled; old job completed with error, error identifier = cold restart
0008 0000	After CP_READY: Send enabled
0022 len	After running the SEND with RLO=1: Job active; Send and Receive disabled; data transfer completed (len = number of bytes sent by the PLC)
(0002 0000)	(Can be entered by the user program for signal edge generation)
0004 0000	After the CP has processed the function; job completed without error; Send enabled

Second version: Job with acknowledgment data (e.g. Read_lists_and_flags)

In this situation, the function code and any management data are transferred with the SEND direct (ANR 202). The transfer of the data is acknowledged by the CP. After processing the command, the acknowledgment data are made available by the CP 2430 and read by the PLC using a RECEIVE direct (ANR 202).

Possible status words (Error-free sequence)

ANZW (hex)	Remarks
000A 0000	After SYNCHRON: Send and Receive disabled; old job complete with error, error identifier = cold restart
0008 0000	After CP_READY: Send enabled
0022 len	After running through the SEND with RLO=1: Job active; Send and Receive disabled; data transfer completed (len = number of bytes transmitted by the PLC)
0023 0000	After the function has been processed by the CP: Job active; Send disabled; Receive enabled
0066 len	After running through the RECEIVE with RLO=1: Job completed without error; Send and Receive disabled; data acceptance completed (len = number of bytes read by the PLC)
0064 len	After the CP has enabled the SEND (at the latest after one FW cycle (approximately 6ms))
0X6A len	After RECEIVE with RLO=1 has run: Job completed with error (X = error identifier); Send and Receive disabled; data acceptance completed (len = number of bytes read by the PLC)
0X68 len	After the CP has enabled the SEND (at the latest after one FW cycle (approximately 6ms))

Sending AS-I Data Bits With ANR 200

Possible status words (Error-free sequence)

ANZW (hex)	Remarks
000A 0000	After SYNCHRON: Send and Receive disabled; old job completed with error, error identifier = cold restart
0008 0000	After CP_READY: Send enabled
0026 len	After the SEND with RLO=1 is run through: Job completed without error; Send and Receive disabled; data transfer completed (len = number of bytes transmitted by the PLC)
(0006 0000)	(Can be set by the user program for signal edge generation)
0004 0000	After the SEND has been enabled by the CP: (At the latest after one FW cycle (approximately 6ms))

Reading the AS-I Data Bits With ANR 201

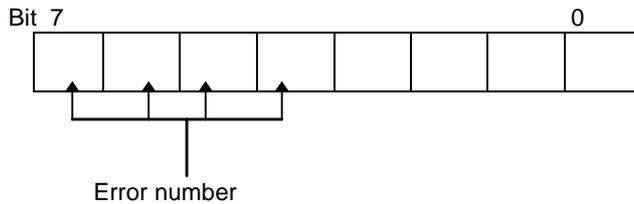
Possible status words (Error-free sequence)

ANZW (hex)	Remarks
000A 0000	After SYNCHRON: Send and Receive disabled; old job completed with error, error identifier = cold restart
000B 0000	After CP_READY: Receive enabled
0046 len	After the RECEIVE with RLO=1 has run: Job completed without error; Send and Receive disabled; data acceptance completed (len = number of bytes read by the PLC)
(0006 0000)	(Can set by the user program for signal edge generation)
0005 0000	After the CP has enabled the RECEIVE: (At the latest after one FW cycle (approximately 6ms))

B.4 The Parameter Assignment Error Byte PAFE

PAFE is set when the handling block detects a parameter assignment error.

Meaning of the individual bits:



Bit 0 0 = no error

 1 = error

Bit 1...3 not used

Bit 4...7 output of the error number:

0 no error

1 wrong ORG format

2 area does not exist (DB)

3 area too short

4 timeout error

5 wrong status word

6 irrelevant for the CP 2430

7 interface does not exist

8 interface not ready

9 interface overloaded

A free

B illegal job number ANR

C interface not acknowledged or enabled.

D not used

E not used

F not used

C Further Reading

- /1/ ASI Das Aktuator-Sensor-Interface für die Automation
Werner Kriesel, O.W. Madelung, Carl Hanser Verlag München Wien 1994
- /2/ ASI Complete Specification
can be ordered from the ASI association e.V.
(The AS-I technology is promoted by the ASI association e. V.).
Address: ASI-Verein e.V.
Auf den Broich 4A
51519 Odenthal
Germany
Tel.: 02174 / 40756
Fax.:02174 / 41571
- /3/ SINEC Industrial Communications Networks
Catalog IK 10
- /4/ Handling blocks are described in the following:
For the S5-115 U as part of the User Manual
Order no.: 6 ES 5998-3UFx 1 ^{*)} for CPU 945
Order no.: 6 ES 5998-0UFx 3 ^{*)} for CPU 941 - CPU 944
For the S5-135 U: can be ordered as a package HDB Software + Description
Order no.: 6 ES 5842-7CB 01 for CPU 928 A/B - CPU 948
For the S5-155 U: can be ordered as a package HDB Software + Description
Order no.: 6 ES 5846-7CA 01 for CPU 946 / 947

^{*)} x : randomly

D Abbreviations / Terms

AS-I	Actuator-Sensor-Interface
APF cable	ASI Power Fail. Flag or LED display indicating that the power supply on the AS-I is too low or has failed (e.g. AS-I power unit defective)
CP	Communications Processor: module for installation in computers and programmable logic controllers.
CP 2430	Communications processor for SIMATIC S5-115U, S5-135U and S5-155U programmable logic controllers on SINEC S1.
LAS	List of activated slaves
LDS	List of detected slaves
LPS	List of configured (permanent) slaves
PG	Programmer (programming device)
AG	Programmable logic controller; e.g. SIMATIC S5 PLC
SINEC	'Siemens Network Architecture for Automation and Engineering', Range of Siemens products for industrial communication. □

E Notes on the CE Marking of SINEC Products

Product Name CP 2430 6GK1 243-0SA00

EC EMC Directive 89/336/EEC The SINEC products listed above meet the requirements of the EC Directive 89/336/EEC "Electromagnetic Compatibility"



The EC conformity certificates are kept for the authorities responsible according to the EC directives listed above at the following address:

Siemens Aktiengesellschaft
Bereich Automatisierungstechnik
Industrielle Kommunikation (AUT 93)
Postfach 4848
D-90327 Nürnberg
Federal Republic of Germany

Area of Application EMC The product meets the following requirements:

Area of application	Requirements	
	Emission	Immunity
Industry	EN 50081-2 : 1993	EN 50082-2 : 1995

The product can also be used in the residential environment (residential, commercial and light industry).

Area of application	Requirements	
	Emission	Immunity
Residential	Individual approval	EN 50082-1 : 1992

You must acquire the individual approval from the respective national authority or testing body.

Installation Guidelines This product meet the requirements providing you adhere to the installation guidelines

1. Manual of the CP 2430 Master Module;
2. System Manual AG S5-135U/155U; Manual for S5-115U/H/F

Installation of the Equipment Programmable logic controllers of the SIMATIC S5-135U/155U series must be installed in metal cabinets according to these guidelines. Programmable logic controllers of the SIMATIC S5-115U/H/F series must be installed in grounded, closed metal cabinets (for example, switchgear cubicles)

Working in Cabinets To protect the module from electrostatic discharge, make sure that you neutralize any electrostatic charge on your body before opening the cabinet.

Notes for the Manufacturers of Machines The product is not a machine in the sense of the EU directive. There is therefore no conformity certificate for the EU directive 89/392 for machines. If the product is part of the electrical equipment of a machine, the manufacturer of the machine must include the product in the conformity certificate

procedure for the machine.

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