

SIEMENS



Industrial Controls

AS-Interface

AS-i Master CM 1243-2 and AS-i Data Decoupling Unit DCM 1271
for SIMATIC S7-1200

Manual

Edition

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Answers for industry.

Industrial Controls

AS-Interface

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Manual

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WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

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

NOTICE

indicates that property damage can result if proper precautions are not taken.

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Preface

Purpose of this manual

This manual supports you in using the following AS-i modules:

- AS-i master CM 1243-2
- AS-i data decoupling unit DCM 1271

We recommend the following procedure if ...

- ... you want to gain an overview of the complete topic of AS-Interface:
First read the manual "System Manual AS-Interface (Edition 11/2008) with Supplements (Edition 09/2010)" (order number: 3RK2703-3BB02-1AA1)
There you will find general information about AS-Interface, referred to below as AS-i.
The manual is available on the Internet
(<http://support.automation.siemens.com/WW/view/de/26250840/0/en>).
- ... you are configuring an AS-i system and commissioning it and are using the AS-i master CM 1243-2 and the AS-i data decoupling unit DCM 1271:
You will find the necessary information regarding connection and operation of the AS-i master CM 1243-2 in the following sections:
 - "Technical description (Page 11)"
 - "Displays and connections of the AS-i data decoupling unit DCM 1271 (Page 23)"
 - "Installation, connection and commissioning of the modules (Page 29)"
 - "Configuring with STEP 7 (Page 37)"
- ... you want to know how the AS-i master CM 1243-2 must be operated from the viewpoint of the automation system:
 - Read section "Data exchange between the user program and AS-i slaves (Page 47)" in this manual
- ... you want to know how to diagnose and rectify faults in the system:
 - Read section "Diagnostics (Page 99)" in this manual
 - Read section "Troubleshooting / fault displays (Page 105)" in this manual

Preconditions

For an understanding of the complete document, the following is necessary:

- Basic knowledge of SIMATIC S7, STEP 7
- Knowledge of the manual "System Manual AS-Interface (Edition 11/2008) with Supplements (Edition 09/2010)" (order number: 3RK2703-3BB02-1AA1)

The manual is available on the Internet

(<http://support.automation.siemens.com/WW/view/de/26250840/0/en>).

FAQs

You will find FAQs on Siemens AS-i products on the Internet on the Service and Support pages of Industry Automation

(<http://support.automation.siemens.com/WW/view/en/10805888/133000>)

See also

Using the data record interface (Page 55)

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Technical description

1.1 General information about operation, safety instructions

Use of AS-i master CM 1243-2

The AS-i master CM 1243-2 is integrated in the S7-1200 automation system as a communication module.

Safety instructions

 WARNING
Risk of explosion when connecting or disconnecting the device Can cause death, serious injury, or property damage Explosion hazard Do not disconnect equipment when a flammable or combustible atmosphere is present.
NOTICE
Protection from transient overvoltage Implement measures to prevent transient overvoltages of more than 40% of the rated voltage. This is ensured if you operate the devices exclusively with SELV (Safety Extra Low Voltage).

See also

Use of the AS-i master CM 1243-2 (Page 12)

Use of the AS-i data decoupling unit DCM 1271 (Page 13)

S7-1200 System Manual

<http://support.automation.siemens.com/WW/view/de/36932465/0/en>

1.2 Overview of the modules

1.2.1 AS-i master CM 1243-2

1.2.1.1 Use of the AS-i master CM 1243-2

The AS-i master CM 1243-2 permits the connection of an AS-i line to the automation system ("AS" or "PLC") of the SIMATIC S7-1200 series.

With the help of the AS-i master CM 1243-2, you can access the inputs and outputs of the AS-i slaves from the automation system. You can access binary or analog values depending on the slave type.

All AS-i slaves according to AS-i specification V3.0 can be operated, with the exception of slaves according to to slave profiles 7.1 and 7.2.

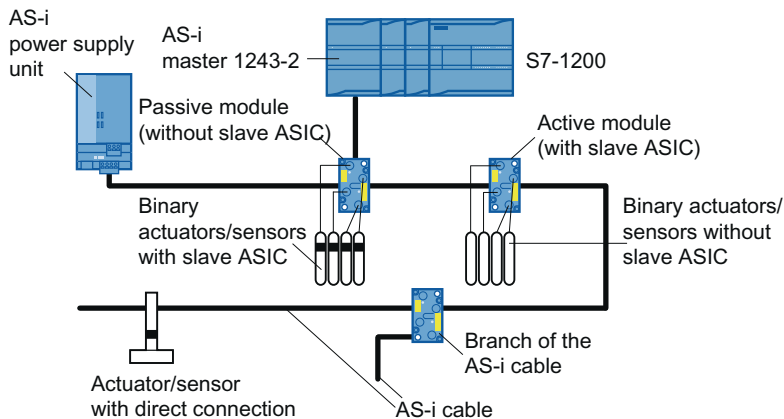


Figure 1-1 Use of the master module AS-i master CM 1243-2 in the S7-1200

1.2.1.2 Scope of delivery of AS-i master CM 1243-2

The following components are included in the scope of supply:

1. AS-i master CM 1243-2 (order number 3RK7243-2AA30-0XB0)
2. Removable screw-type terminal block (pre-assembled)

Note

Removable screw-type terminal block

The removable screw-type terminal block can be reordered as an accessory.
(Order number: 3RK1901-3MA00)

3. Operating Instructions

1.2.2 AS-i data decoupling unit DCM 1271

1.2.2.1 Use of the AS-i data decoupling unit DCM 1271

The AS-i data decoupling unit DCM 1271 is required as an accessory to the AS-i master CM 1243-2 if:

- an AS-i power supply unit is not integrated into the bus
- and power is supplied from a standard power supply unit.

In order to supply the AS-Interface from a standard power supply unit, a data decoupling unit must be connected between the voltage supply and AS-i network (AS-i Power 24 V).

Note

Several CM 1243-2 AS-i masters in one automation system

If several CM 1243-2 AS-i masters are operated in one automation system, each AS-i master will need its own AS-i data decoupling unit DCM 1271.

Integrated ground fault detection

With the help of the AS-i data decoupling unit DCM 1271, ground faults can be detected on the AS-i cable. The information can be transferred to the S7-1200 CPU via terminals.

Overload protection

The AS-i data decoupling unit has integrated overload protection.

When there is a short circuit or overload on an AS-i cable, the relevant AS-i line is switched off (electronic transistor output) and is thereby decoupled from the power source (selectivity).

The restart occurs automatically after about 5 seconds.

1.2.2.2 Scope of supply of the AS-i data decoupling unit DCM 1271

The following components are included in the scope of supply:

1. AS-i data decoupling unit DCM 1271 (Order No.: 3RK7271-1AA30-0AA0)
2. Removable screw-type terminal blocks (pre-assembled)
 - 5-pole terminal under the bottom cover
 - 3-pole terminal on the top

Note

Removable screw-type terminal blocks

The removable screw-type terminal blocks can be reordered as accessories.

Order numbers:

- 5-pole terminal: 3RK1901-3MA00
 - 3-pole terminal: 3RK1901-3MB00
-

3. Operating Instructions

1.2.3 System requirements

System requirements

- The firmware version of the CPU must be at least V2.2.
Max. 1 AS-i master CM 1243-2 can be connected.
- A possible expansion to the number of AS-i masters that can be connected will be announced via the Service & Support Portal on the Siemens Internet site.
- STEP 7 Basic or Professional V11 with Service Pack 2
- Hardware Support Package (HSP) for STEP 7 V11 SP2

1.3 Permissible slots for modules

AS-i master CM 1243-2

The AS-i master CM 1243-2 can be inserted into any communication module slot in the automation systems S7-1200 CPU. Any combination with other S7-1200 communication modules (e.g. RS232, RS485, GPRS) is permitted within the S7-1200 system.

AS-i data decoupling unit DCM 1271

The AS-i data decoupling unit DCM 1271 has no connection to the S7 communication bus. The AS-i data decoupling unit DCM 1271 must therefore always be plugged into the left of the last of up to three communication modules. When different communication modules are used, it is recommended that the AS-i master CM 1243-2 is inserted to the left of the other communication modules and the AS-i data decoupling unit DCM 1271 is inserted directly onto the AS-i master CM 1243-2.

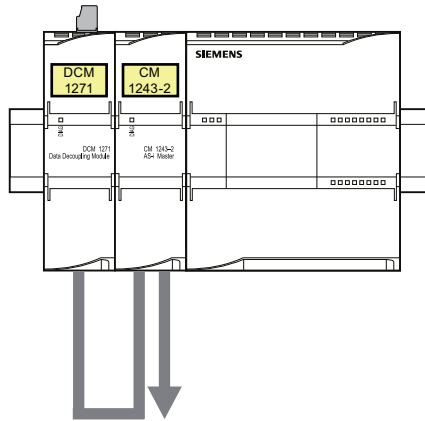


Figure 1-2 Maximum configuration: S7-1200, AS-i master CM 1243-2 and AS-i data decoupling unit DCM 1271

Note

Maximum configuration

With CPU firmware version V2.2 a maximum of one AS-i master CM 1243-2 can be connected.

A possible expansion to the number of AS-i masters that can be connected will be announced via the Service & Support Portal on the Siemens Internet site.

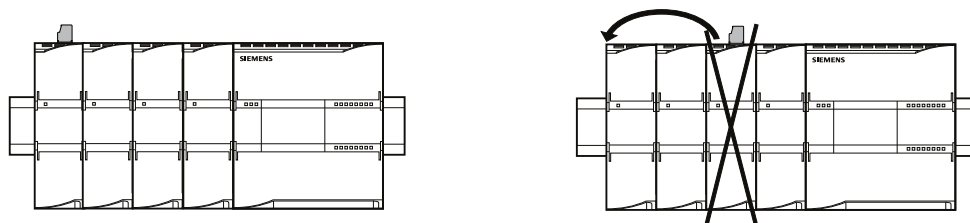


Figure 1-3 Device arrangement: S7-1200, other communication modules, AS-i master CM 1243-2 and AS-i data decoupling unit DCM 1271

Displays and connections of the AS-i master CM 1243-2

2

Position of the display elements and the electrical connections

The LEDs for detailed display of the module states are located under the top enclosure cover of the AS-i master CM 1243-2.

The terminals for AS-Interface and the functional grounding are located under the cover at the bottom of the AS-i master CM 1243-2.

Opening the enclosure covers

Open the upper or lower enclosure cover by rotating it downwards or upwards as shown in the figure. The enclosure covers have been extended for this purpose to form a handle.

You will find further details in the "SIMATIC S7 S7-1200 Programmable Controller" System Manual (order number: 6ES7298-8FA30-8BH0). The S7-1200 System Manual (<http://support.automation.siemens.com/WW/view/de/36932465/0/en>) is available on the Internet.

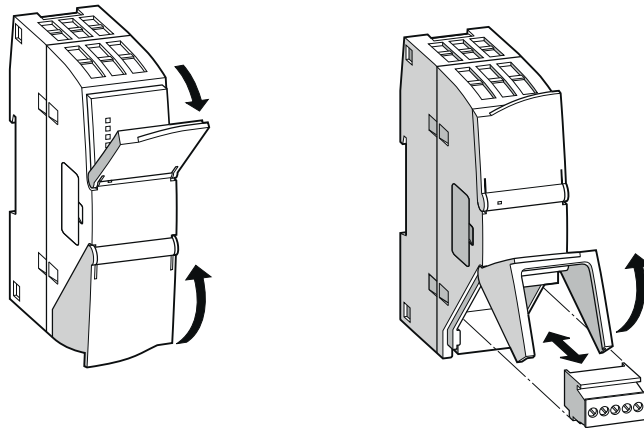
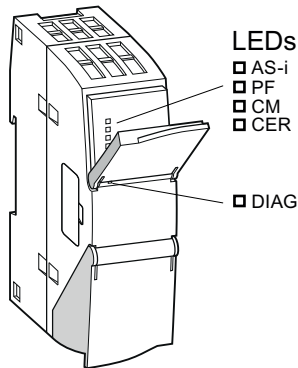


Figure 2-1 Enclosure covers

2.1 LEDs of the AS-i master CM 1243-2

2.1.1 Meaning of the LEDs of the AS-i master CM 1243-2

Arrangement of the LEDs of the AS-i master CM 1243-2



- AS-i AS-i interface
- PF Peripheral fault
- CM Configuration mode
- CER Error in configuration
- DIAG Diagnosis

Figure 2-2 LEDs

LED	LED colors	Meaning
DIAG	Display of the system status and system errors (Diagnosis)	
	LED off	There is no supply over the communications bus.
	Green, flashing	The AS-i master CM 1243-2 is in start-up mode or is not configured via STEP 7.
	Green, lit	The AS-i master CM 1243-2 has started up without errors.
	Red, flashing	A fault is present: <ul style="list-style-type: none"> • AS-i supply voltage missing • Internal error • Error in configuration • Parameterization error • Peripheral fault
AS-i	Details of AS-Interface status	
	LED off	The AS-i master CM 1243-2 is offline.
	Red, lit	A fault has occurred and the AS-i bus has failed, e.g. the supply voltage for AS-Interface is too low.
	Red, flashing	A fault has occurred, without failure of the AS-i bus, e.g. when an AS-i slave reports a parameterization error.
	Green, lit	No fault on the AS-i bus.

LED	LED colors	Meaning
PF	Indication of peripheral faults	
	Red, lit	A peripheral fault has occurred, e.g. overload on standard outputs and /or overload of sensor power supply of the standard inputs.
CM	Indication of operating mode (Configuration Mode)	
	Green, lit	The AS-i master CM 1243-2 is in configuration mode.
	LED off	The AS-i master CM 1243-2 is in protected mode.
CER	Indication of errors in the configuration (Configuration Error) Indicates whether the slave configuration detected on the AS-i cable matches the PLANNED configuration (LPS) configured in the AS-i master CM 1243-2.	
	Yellow, lit	<ul style="list-style-type: none"> • A configured AS-i slave is not detected on the AS-i cable (e.g. the slave has failed). • An AS-i slave that has not yet been configured is detected on the AS-i cable. • A connected slave has different configuration data (I/O configuration, ID code) than the slave configured in the AS-i master CM 1243-2.

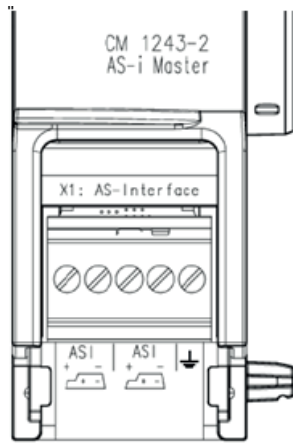
2.2 Electrical connections of the AS-i master CM 1243-2


Power supply of the AS-i master CM 1243-2

The AS-i master CM 1243-2 is supplied over the communications bus of the S7-1200. This means that a diagnostics message can still be sent to the S7-1200 following failure of the AS-i supply voltage. The connection to the communications bus is on the right-hand side of the AS-i master CM 1243-2.

AS-Interface terminals

The removable terminal for connecting the AS-i cable is located behind the lower cover on the front of the AS-i master CM 1243-2.



If the AS-i shaped cable is used, you can recognize the correct polarity of the cable by means of the symbol .

Information on how to remove and re-install the terminal block can be found in the system manual "SIMATIC S7-1200 Programmable Controller" (Order No.: 6ES7298-8FA30-8AH0).

Note


Maximum current carrying capacity of the terminal contacts

The current carrying capacity of the connection contacts is max. 8 A. If this value is exceeded on the AS-i cable, the AS-i master CM 1243-2 must not be "looped in" to the AS-i cable, but must instead be connected via a spur line (only one connection pair assigned on the AS-i master CM 1243-2).

Please also ensure that the cables used are suitable for operating temperatures of at least 75°C if current is being conducted via the AS-i master and currents of greater than 4 amperes are present.

You will find additional information on connecting the AS-i cable in the section "Installation, connection and commissioning of the modules" in the manual "AS-i Master CM 1243-2 and AS-i data decoupling unit DCM 1271 for SIMATIC S7-1200".

Terminal assignment

Label	Meaning
ASI+	AS-i connection – positive polarity
ASI-	AS-i connection – negative polarity
	Functional ground

See also

S7-1200 Manual (<http://support.automation.siemens.com/WWW/view/de/36932465/0/en>)

Displays and connections of the AS-i data decoupling unit DCM 1271

3

Position of the display elements and the electrical connections

The LEDs for detailed display of the module states are located behind the top enclosure cover of the AS-i data decoupling unit DCM 1271.

The terminals for AS-Interface and the connection for ground fault detection are located under the cover at the bottom of the AS-i data decoupling unit DCM 1271.

The infeed from the power supply unit and the connection for functional grounding are located on the top of the AS-i data decoupling unit DCM 1271.

Opening the enclosure covers

Open the upper or lower enclosure cover by rotating it downwards or upwards as shown in the figure. The enclosure covers have been extended for this purpose to form a handle.

You will find further details in the "SIMATIC S7 S7-1200 Programmable Controller" System Manual (order number: 6ES7298-8FA30-8BH0). The S7-1200 System Manual (<http://support.automation.siemens.com/WW/view/de/36932465/0/en>) is available on the Internet.

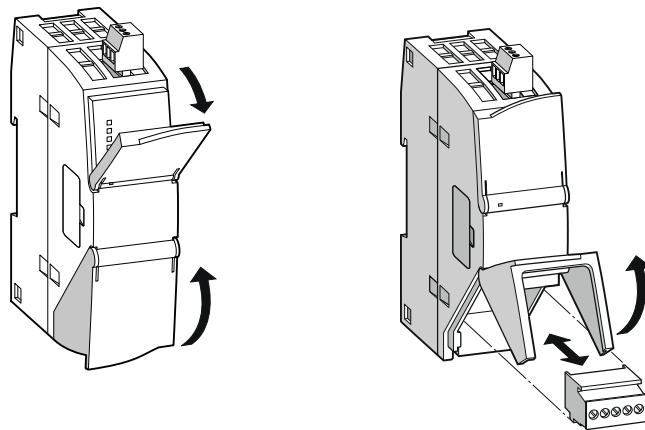
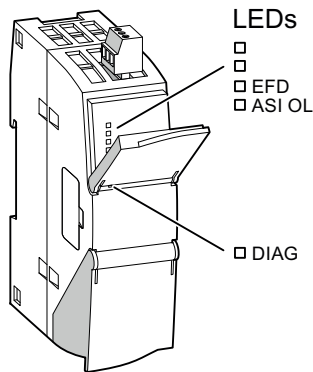


Figure 3-1 Enclosure covers

3.1 LEDs of the AS-i data decoupling unit DCM 1271

Arrangement of the LEDs of the AS-i data decoupling unit DCM 1271



EFD Earth Fault Detection
 ASI OL AS-i Overload
 DIAG Diagnose

Figure 3-2 LEDs

The AS-i data decoupling unit DCM 1271 has various LEDs for status indication:

- LED "DIAG" on the front plate of the AS-i data decoupling unit DCM 1271
- LEDs "EFD" and "ASI OL" underneath the upper enclosure cover of the AS-i data decoupling unit DCM 1271

Indication of the operating and communicating status of the AS-i data decoupling unit DCM 1271

The LEDs indicate the operating status of the AS-i data decoupling unit DCM 1271 as shown below:

Table 3- 1 Indication of the basic states of the AS-i data decoupling unit DCM 1271

DIAG (Diagnosis)	EFD (Earth Fault Detection)	ASI OL (AS-i Overload)	Meaning
Off	Off	Off	Voltage OFF
green	Off	Off	Normal operation, without errors
Red, flashing	Red	—	A ground fault has been detected on the AS-i cable.
Red, flashing	—	Red	An overload has been detected on the AS-i cable.

Electrical connections of the AS-i data decoupling unit DCM 1271

The AS-i data decoupling unit DCM 1271 has connections for the infeed from the power supply unit on the top of the device and the outgoing feeder for supplying the AS-i cable underneath the lower cover on the front of the device. The terminals for connection of the ground fault detection are also located here.

Both terminals can be removed to make connection easier.

You will find instructions for removing and reinstalling the terminals in the "SIMATIC S7-1200 Programmable Controller" System Manual (order number: 6ES7298-8FA30-8BH0) on the Internet (<http://support.automation.siemens.com/WW/view/de/36932465/0/en>).

Terminal assignment for connection of the power supply unit

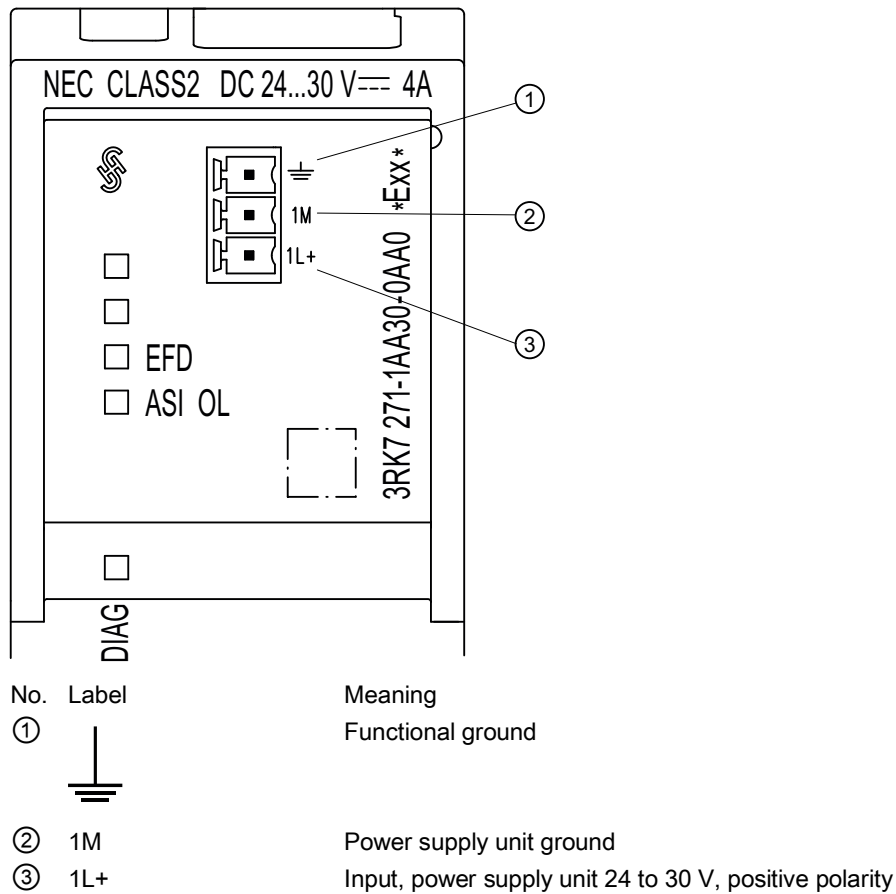
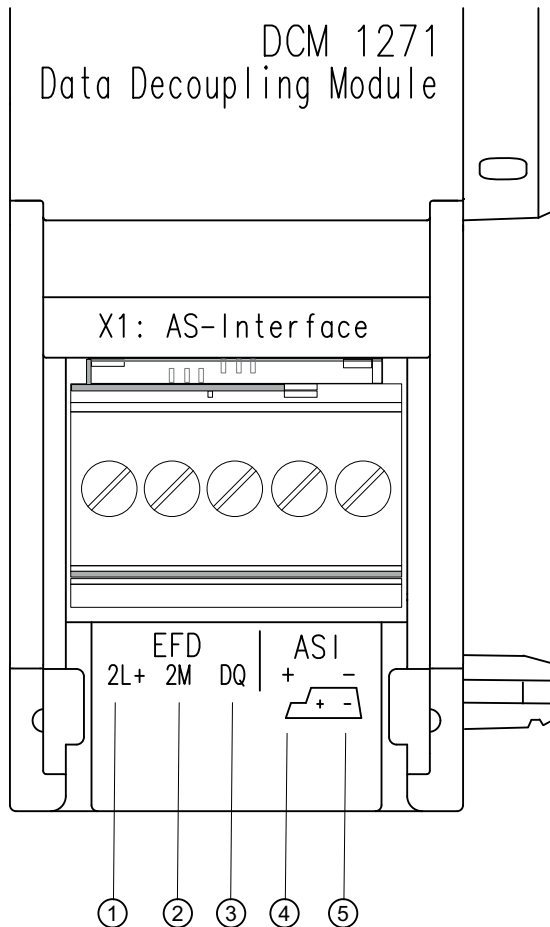


Figure 3-3 Terminal labeling for power supply unit


Terminal assignment for connection of AS-Interface and ground fault detection



No.	Label	Meaning
①	2L+	Ground fault detection: Input, power supply unit 24 to 30 V, positive polarity
②	2M	Ground fault detection: Ground
③	DQ	Output, ground fault detection In the case of a ground fault, the voltage is switched through from 2L+ to DQ.
④	ASI+	Output, AS-i – positive polarity
⑤	ASI-	Output, AS-i – negative polarity

Figure 3-4 Terminal labeling for AS-Interface and ground fault detection

Note

If the AS-i shaped cable is used, you can recognize the correct polarity of the cable by means of the symbol .

Note

A connected power supply unit must comply with the PELV/SELV (Protective Extra Low Voltage/Safety Extra Low Voltage) standard and have a residual ripple of < 250 mVpp. The power supply unit used must limit the output voltage to a maximum of 40 V in the event of a fault.

Additional information on the electrical connections

Read section Installation, connection and commissioning of the modules (Page 29) for instructions on connecting the electrical connections.

You can find technical details on the electrical connections in section Technical data (Page 109).

3.1 LEDs of the AS-i data decoupling unit DCM 1271

Installation, connection and commissioning of the modules


4


4.1 Safety instructions

Safety instructions for use of the device


The following safety instructions must be observed during installation and operation of the individual devices and all the associated work, such as assembly, connection, device replacement and opening the device.

General notes

 WARNING
Safety Extra Low Voltage Can cause death, serious injury, or property damage
The device is designed for operation with a directly connectable Safety Extra Low Voltage (SELV) through a power supply with limited output (Limited Power Source, LPS); this does not apply to 100 V ... 240 V devices.
It is therefore only permitted to connect Safety Extra Low Voltages (SELV) with Limited Power Source (LPS) in accordance with IEC 60950-1 / EN 60950-1 / VDE 0805-1 to the supply terminals, or the power supply unit used to supply the device must comply with NEC Class 2 according to the National Electrical Code (r) (ANSI / NFPA 70).
Additionally for devices with redundant power supply:
If the device is connected to a redundant power supply (two separate power supplies), both must fulfill the requirements listed above.

 WARNING
Dangerous voltage Can cause death, serious injury, or property damage
Always disconnect the device from the power supply before opening it.

General notes on use in hazardous areas


 WARNING
Risk of explosion when connecting or disconnecting the device Can cause death, serious injury, or property damage Explosion hazard Do not disconnect equipment when a flammable or combustible atmosphere is present.

Note

Requirements for the control cabinet

If the device is used in areas subject to explosion hazard according to Class I, Division 2 or Class I, Zone 2, it must be installed in an appropriate control cabinet or enclosure.

Notes on use in hazardous areas according to ATEX

 WARNING
Requirements for the control cabinet For compliance with EU Directive 94 / 9 (ATEX 95), the enclosure must fulfill the requirements of IP54 or higher according to EN 60529.

NOTICE
Protection from transient overvoltage Implement measures to prevent transient overvoltages of more than 40% of the rated voltage. This is ensured if you operate the devices exclusively with SELV (Safety Extra Low Voltage).

Before installation and commissioning

Note

Read the "SIMATIC S7-1200 Programmable Controller" System Manual

Before installation, connection and commissioning, read the corresponding sections in the "SIMATIC S7-1200 Programmable Controller" System Manual.

Follow the instructions in the system manual for installation and connection.

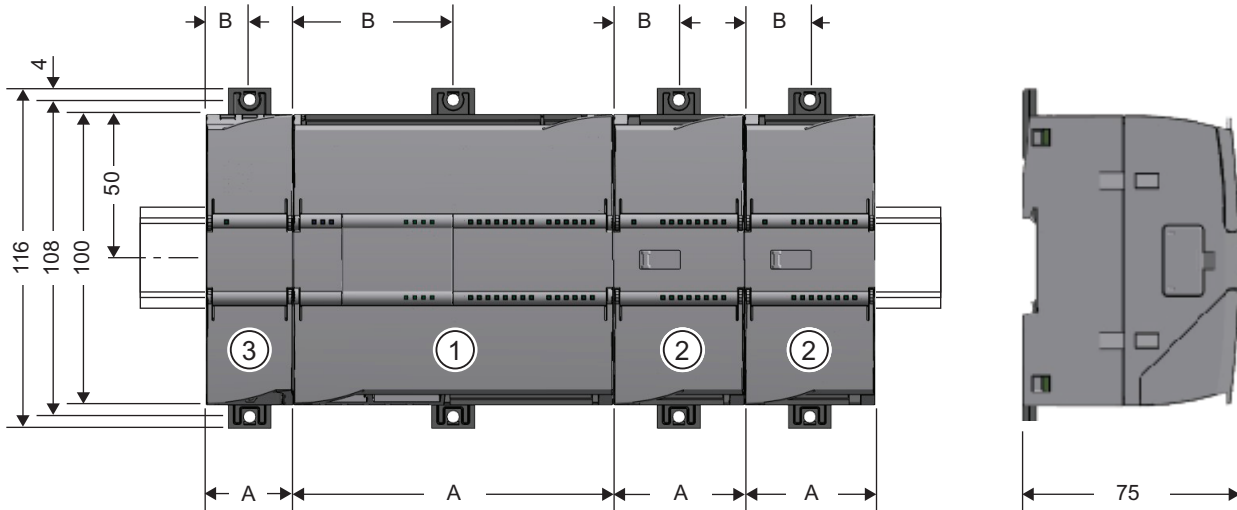
Ensure that the power supply is switched off during installation /removal of the devices.

You can find the system manual on the Internet

(<http://support.automation.siemens.com/WW/view/de/36932465/0/en>) (order number: 6ES7298-8FA30-8AH0).

4.2 Preparation

Dimensions for installation



S7-1200 devices		Width A	Width B ¹⁾
CPU ①	CPU 1211C, CPU 1212C	90 mm	45 mm
	CPU 1214C	110 mm	55 mm
Signal modules ②	8 or 16 digital I/O 2, 4 or 8 analog I/O Thermocouple, 4 or 8 I/O RTD, 4 I/O	45 mm	22.5 mm
	16 analog I/O RTD, 8 I/O	70 mm	35 mm
Communication interfaces ③	CM 1241 RS232 and CM 1241 RS485	30 mm	15 mm
	CM 1243-5 (PROFIBUS master) CM 1242-5 (PROFIBUS slave)	30 mm	15 mm
	CP 1242-7 (GPRS-CP)	30 mm	15 mm
	CM 1243-2 AS-i master	30 mm	15 mm
Special modules ③	DCM 1271 AS-i data decoupling unit	30 mm	15 mm

1) Width B: Distance between edge of enclosure and center of the drilled hole of the standard mounting rail terminal

Standard mounting rail terminal

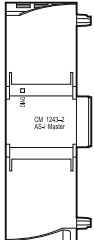
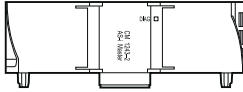
All CPUs, SMs, CPs and CMs can be mounted on the standard mounting rail or in the control cabinet. Use the withdrawable rail terminals for fixing the device to the standard mounting rail. These terminals also latch in place in the withdrawn position to allow the device to be installed in a switchboard. The internal size of the drilled hole in the standard mounting rail terminal on the device is 4.3 mm.

Mounting position

Note

Mounting position


On mounting, the upper and lower ventilation slots of the module must not be covered and good ventilation must be ensured. Above and below the module, a clearance of 25 mm must be maintained for air circulation as protection against overheating. Note the permissible temperature ranges in accordance with the mounting position.

Mounting position / permissible temperature range	Mounting position
Horizontal mounting of the standard mounting rail: 0 °C ... 55 °C	
Vertical mounting of the standard mounting rail: 0 °C ... 45 °C	

See also


Configuring with STEP 7 (Page 37)

4.3 Installation, connection and commissioning of the AS-i master CM 1243-2

 WARNING
<p>Dangerous voltage Can cause death, serious injury, or property damage. Always switch off the power before wiring the S7-1200.</p>

Step	Execution	Notes and explanations
1	Insert the AS-i master CM 1243-2 on the standard rail.	Use a 35 mm standard mounting rail. The slots for communication modules to the left of the CPU can be used.
2	Connect the AS-Interface cable to the AS-i master CM 1243-2.	The connections are underneath the lower cover of the AS-i master CM 1243-2. You can find more information about connecting in section "Electrical connections of the AS-i master CM 1243-2 (Page 20)".
2a	Connect the terminal (functional ground symbol) with the functional ground of your system	Note the relevant instructions in the Section "Wiring guidelines" in the system manual for SIMATIC S7-1200
3	Switch on the power supply.	
4	Close the front covers of the module and keep them closed during operation.	
5	The next step in commissioning is to download the STEP 7 project data.	The STEP 7 project data of the AS-i master CM 1243-2 is transferred when downloading the station. To download the station, connect the engineering station on which the project data is located to the Ethernet interface of the CPU. For further information about downloading, refer to the following sections of the online help for STEP 7: <ul style="list-style-type: none"> • "Downloading project data" • "Using online and diagnostic functions"

4.4 Installation, connection and commissioning of the AS-i data decoupling unit DCM 1271

 WARNING
Dangerous voltage Can cause death, serious injury, or property damage. Always switch off the power before wiring the S7-1200.

Step	Execution	Notes and explanations
1	Insert the AS-i data decoupling unit DCM 1271 on the standard rail.	Use a 35 mm standard mounting rail. The slots to the left of the communication modules (CM) can be used.
2	Attach the power supply leads to the supplied plug and insert the plug in the socket on the top of the AS-i data decoupling unit DCM 1271.	The assignment is printed on the top of the enclosure next to the socket.
3	Connect the terminals ASI+ and ASI- of the AS-i master CM 1243-2 to the terminals of the same name of the AS-i data decoupling unit DCM 1271.	The connections are underneath the lower cover of the AS-i data decoupling unit DCM 1271. You can find more information about connecting in section "Displays and connections of the AS-i data decoupling unit DCM 1271 (Page 23)".
4 Optional	Connect the terminals for ground fault detection on the AS-i data decoupling unit DCM 1271.	For further information on ground fault detection, see section "Detecting ground faults with DCM 1271 (Page 35)".
5	Switch on the power supply.	
6	Close the front covers of the module and keep them closed during operation.	The AS-i data decoupling unit DCM 1271 cannot be configured in STEP 7.

4.5 Detecting ground faults with DCM 1271

With the help of the AS-i data decoupling unit DCM 1271, ground faults can be detected on the AS-i bus and this information can be transferred to the S7-1200 for further processing.

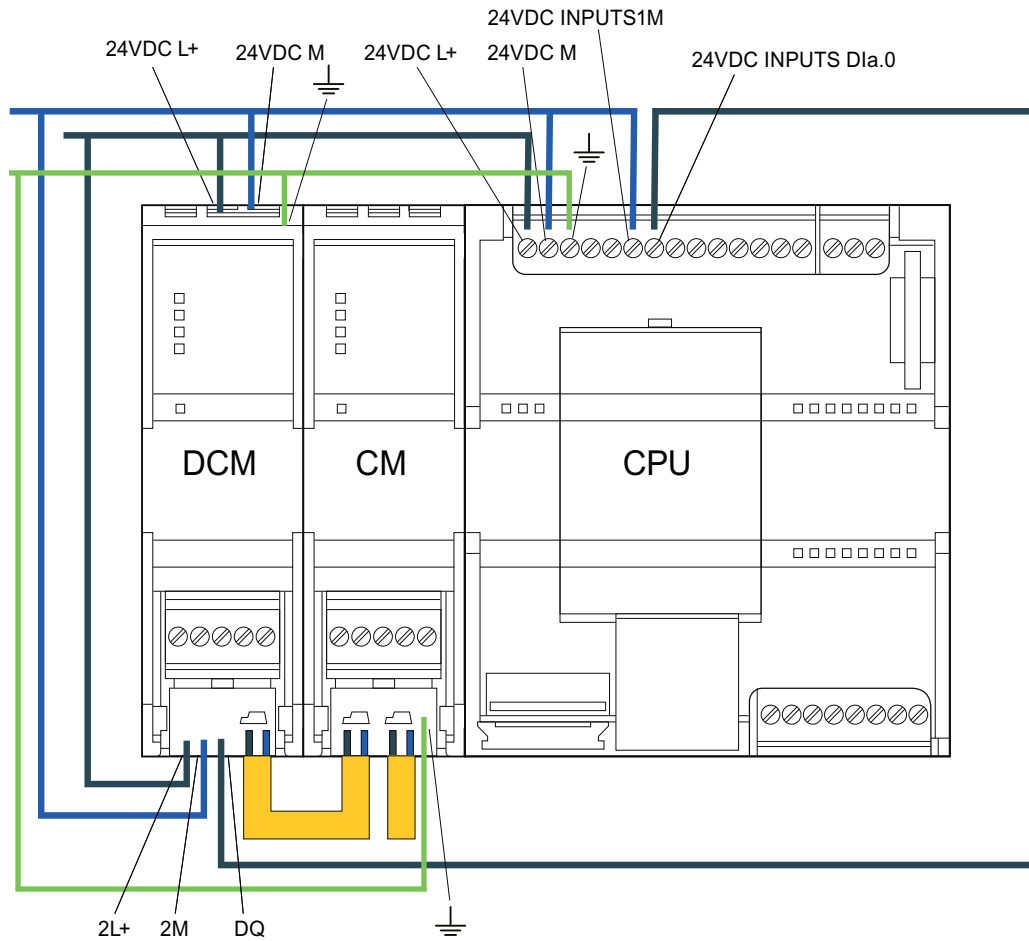
A fault is detected when a connection to ground potential is detected on one of the AS-i cables (ASI+ or ASI-). This is signaled via the output with the terminal designation "DQ". For this purpose, this output must be connected to a spare digital input "DI" of the S7-1200.

The terminal "2M" must be connected to the ground connection for the inputs. The positive potential of the incoming supply must be connected to "2L+".

Terminals "2M" and "2L+" are galvanically isolated from "1M" and "1L+", which enables you to use different power supplies for the inputs and for the operation of the AS-i data decoupling unit DCM 1271.

Connection example

The example below shows the terminal assignment when using the digital input "DI.0" of a SIMATIC S7-1211 CPU. The same power supply is used here for the inputs and for the data decoupling unit.



Signal status

The output "DQ" is connected to "2L+" in the case of a ground fault. In this state, the signal information "1" is available for further processing in the user program of the CPU.

Acknowledgement of the ground fault is not necessary, because the output is automatically reset after the problem has been rectified, i.e. the connection between "2L+" and "DQ" is disconnected.

5

Configuring with STEP 7

5.1 General notes on configuring the AS-i master CM 1243-2 with STEP 7

Preconditions

To configure the AS-i master CM 1243-2, you will need STEP 7 Basic or Professional, Version 11 or higher, Service Pack 2. If this AS-i master is not included in the hardware catalog of the program, you will need a "Hardware Support Package", which you can obtain from the Siemens Service & Support Internet site:

Siemens Service & Support
(<http://support.automation.siemens.com/WW/view/en/47071380/133100>)

Note

AS-i data decoupling unit DCM 1271

The AS-i data decoupling unit DCM 1271 does not have to be configured, because this module does not exchange any data with the S7-1200.

Significance of configuration in STEP 7

Configuration in STEP 7 is essential for use of the AS-i master CM 1243-2 in an S7-1200. A distinction is made here between the necessary basic configuration of the AS-i master and the optional configuration of the AS-i slaves.

See also

Loading the slave configuration (Page 45)

5.2 STEP 7 basic configuration

Inserting the AS-i master CM 1243-2 in the S7-1200 station in STEP 7

The AS-i master CM 1243-2 is taken from the hardware catalog in STEP 7 HW Config in the same manner as any other module, and inserted in the rack of the S7-1200 station in the correct slot.

Configuring the properties of the AS-i master CM 1243-2

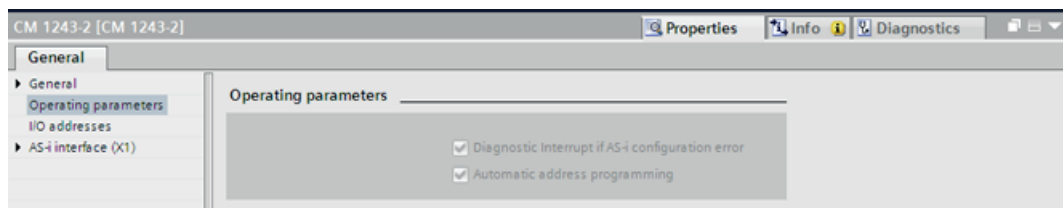
In the STEP 7 inspector window, you can view, configure and change general information, addresses and operating parameters.

Switch to the properties dialog for the AS-i master CM 1243-2.

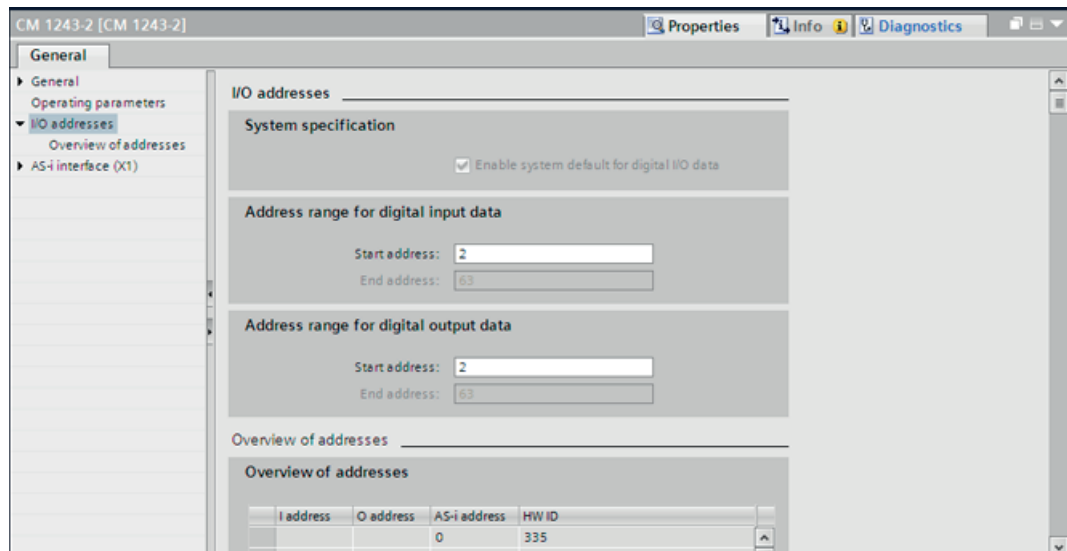
- "General" tab
You can change the name of the AS-i master CM 1243-2 here.
- "Operating parameters" tab
The parameters for the response of the AS-i master are displayed here
- "I/O addresses" tab
The address area can be set here for the I/O addresses in the basic configuration
- "AS-i interface (X1)" tab
You can change the assignment to an AS-i network here.

Note

"Diagnostic interrupt for faults in the AS-i configuration" and "Automatic address programming" are always active and are therefore shown in gray.



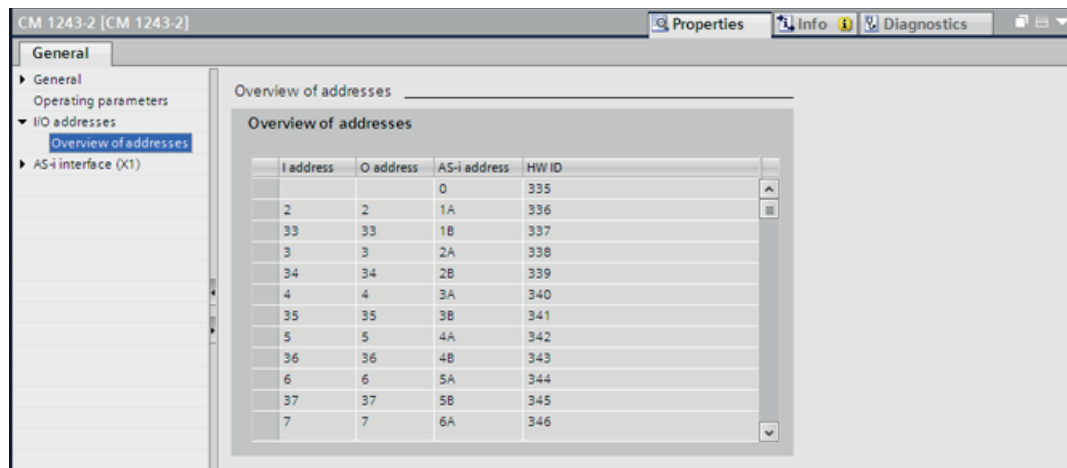
System assignment for logical addresses



During basic configuration, the parameter "System assignment" is automatically activated by STEP 7. This ensures that the system will automatically assign AS-i slave addresses to logical I/O addresses.

A 62 byte address range is reserved by the AS-i master CM 1243-2 and you can specify its position in the process image with the "I/O addresses" settings.

When system assignment is activated, the assignment of AS-i address to logical I/O address is shown in STEP 7:



If you do not configure any slaves, you must inform the AS-i master CM 1243-2 about the actual bus configuration using the online function "ACTUAL > PLANNED" in STEP 7. See section "Loading the slave configuration (Page 45)".

See also

Configuring AS-i slaves (Page 40)

5.3 Configuring AS-i slaves

Advantages of configuring the slaves:

If you configure the AS-i slaves (optional), you specify in STEP 7 those stations with which the AS-i master should communicate. There is then no need to load the slave configuration using the online function ACTUAL -> PLANNED.

- AS-i slaves are displayed in the network view complete with relevant AS-i addresses
- The slave parameters can be configured.
- The configuration of the I/O data of a slave is displayed.
- Access to analog AS-i slaves is possible via the process image of the PLC.
- Diagnostic information is displayed in the form of an icon on the AS-i slave in the network view
- For smaller configurations, fewer I/O addresses are required in the S7-1200 than are provided in the basic configuration.

Points to note when configuring the SIRIUS M200D Standard motor starter

The SIRIUS M200D Standard motor starter can also be parameterized via AS-Interface. In combination with the AS-i master CM 1243-2, this can be performed in STEP 7 directly. It is no longer necessary to execute the parameterization procedure via the PLC program.

The parameters are now set in the inspector window of the M200D motor starter in the section "Module parameters". Please ensure here that the setting "Wait for data record parameters" under "Options" is activated.

For parameter assignment in STEP 7, an M200D motor starter with one of the following product versions is required:

Table 5- 1 Firmware requirements

Order number	Product version
3RK1325-6.S41-.AA.	E08
3RK1325-6.S71-.AA.	E07

Note

Firmware requirements

If your connected M200D motor starter is based on an older product version, you should deactivate parameter assignment in STEP 7. This is done in the inspector window of the M200D.

Deactivation is also necessary when you decide to set the parameters using the "Motor starter ES" software.

Note

A configuration of the AS-i slaves specified through STEP 7 and downloaded into the S7 station is transferred by the CPU on the AS-i master CM 1243-2 during S7 station start-up. Any existing configuration that was determined via the online function "ACTUAL -> PLANNED" will be overwritten.

Procedure

To configure the AS-i slaves, open the hardware catalog in STEP 7. You will find the AS-i slaves under "Field devices".

Three basic types are available:

- Universal AS-i slave (for standard and A/B slaves)
- Universal AS-i F-slave (for Safety At Work applications)
- Siemens AS-i slave

Note**Using AS-i slaves from Siemens**

When you use AS-i slaves from Siemens, you can select the slave directly from the hardware catalog.

To configure an AS-i slave from another manufacturer, you must use the universal AS-i slave or the universal AS-i F-slave.

If an AS-i slave is assigned to the AS-i master in STEP 7, the system will automatically deactivate the "System assignment" parameter of the AS-i master. The 62 byte long address area is also canceled in this case, because when a slave is configured it is assigned to a specific I/O address.

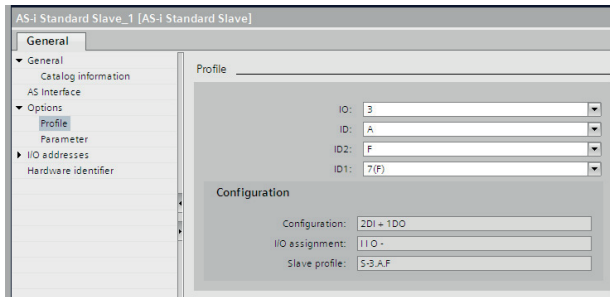
Configuring the properties of universal AS-i slaves

If you are configuring with the universal AS-i slave or universal AS-i F slave, you can set the following parameters:

- Profile ID of the AS-i slave
- Parameters of the AS-i slave
- Logical I/O address of the AS-i slave

You will find the profile ID and meaning of the AS-i slave parameters in the documentation for the AS-i slaves.

The I/O assignment of the slaves is displayed in the section "Configuration" in accordance with the parameterized profile ID.

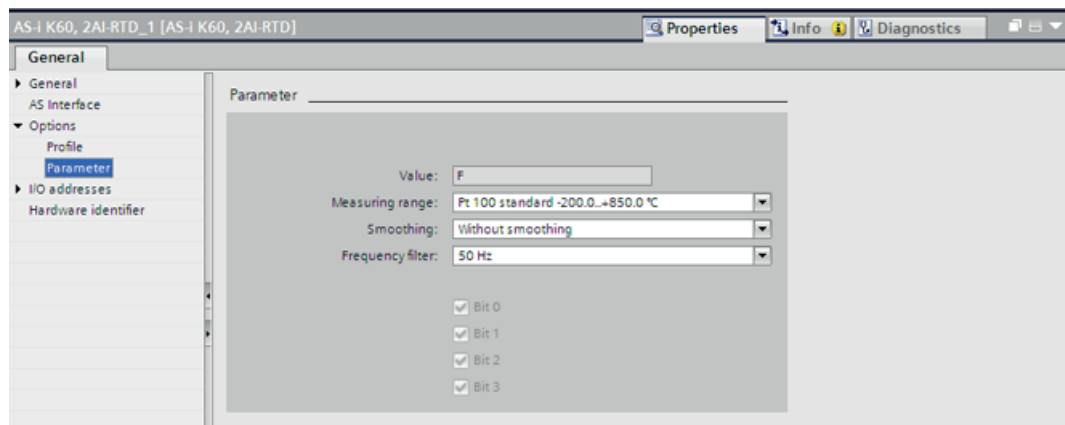


Configuring the properties of Siemens AS-i slaves

When you use an AS-i slave from Siemens, you can select the slave directly from the hardware catalog.

The differences as compared to the universal AS-i slave are as follows:

- The device type is represented as a symbol
- The meaning of the slave parameters is displayed as text.
- The underlying slave profile is already set. The IO, ID and ID2 identifiers do not need to be entered.



Setting the logical I/O addresses of AS-i slaves.

When slaves are configured, each one receives a specific, logical I/O address. This is displayed in the inspector window in STEP 7 and can be changed as required.

5.4 Online functions

5.4.1 Operating modes of the AS-i master CM 1243-2

The AS-i master CM 1243-2 has two operating modes:

- Configuration mode
- Protected mode

Configuration mode

Configuration mode is used for commissioning an AS-i installation.

You switch the AS-i master CM 1243-2 in STEP 7 from protected mode (productive operation) to configuration mode. (The LED "CM" is lit green)

In configuration mode, the AS-i master CM 1243-2 can exchange data with any AS-i slave connected to the AS-i cable, except for AS-i slaves with address "0". Newly added AS-i slaves are immediately detected, activated and included in cyclic data exchange by the master.

In configuration mode, alarms relating to AS-i slave configuration errors are not transferred to the S7-1200.

In this mode, the DIAG LED is also not lit up in red.

Protected mode

Changeover from "Configuration mode" to "Protected mode" is performed in STEP 7. In "Protected mode" the AS-i master CM 1243-2 only exchanges data with the configured AS-i slaves. Configuration can be performed either via STEP 7 (Configuring AS-i slaves (Page 40)) or by executing the function "ACTUAL-->PLANNED" (Accessing AS-i analog data via acyclic services (Page 52)).

See also

Loading the slave configuration (Page 45)

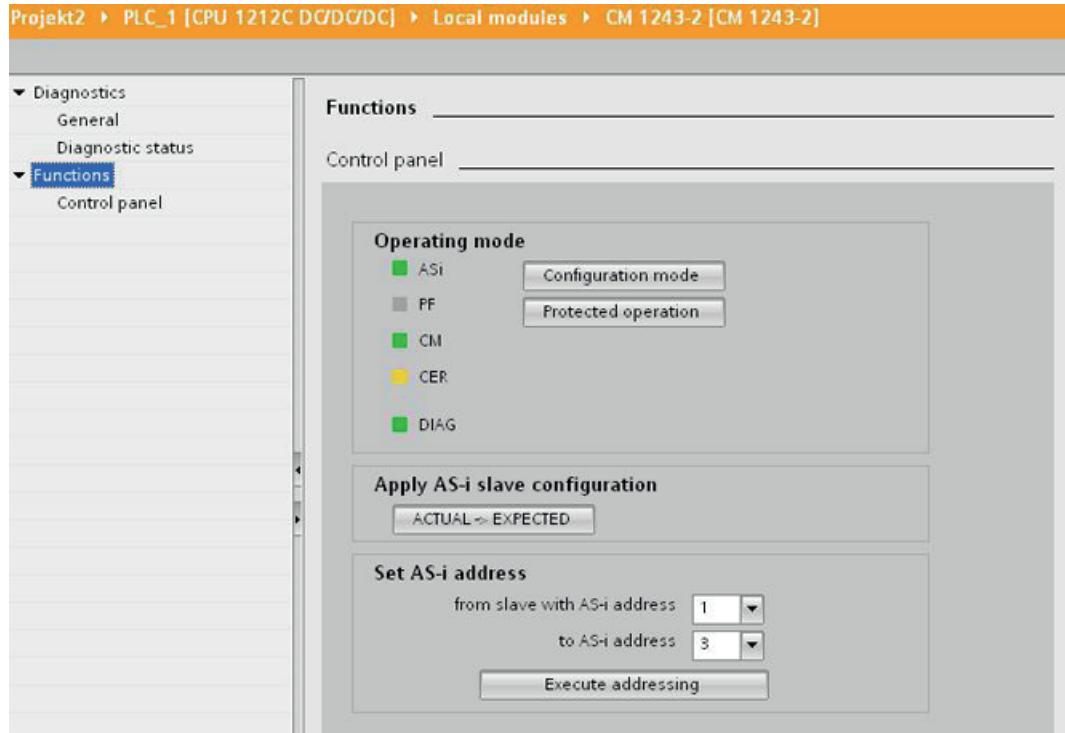
Using the data record interface (Page 55)

STEP 7 basic configuration (Page 38)

5.4.2 Switching operating mode

In STEP 7 "Online" > "Diagnostics" it is possible to switch between protected mode and configuration mode in the "Functions" section. There are two buttons:

- "Configuration mode"
- "Protected mode"



It can be determined from the LEDs on the AS-i master CM 1243-2, and in STEP 7, which mode the AS-i master is in. Further information can be found in section "LEDs of the AS-i master CM 1243-2 (Page 18)".

The operating mode can only be switched when the S7-1200 CPU is in STOP.

Note

Online functions

The online functions can only be performed when at least the basic configuration has been completed and the S7-1200 station has been loaded.

5.4.3 Loading the slave configuration

Application

This step is only necessary if no AS-i slaves have been configured in STEP 7.

If a slave configuration has already been loaded into the AS-i master CM 1243-2, the function for loading the slave configuration will be deactivated by the system and can therefore not be selected.

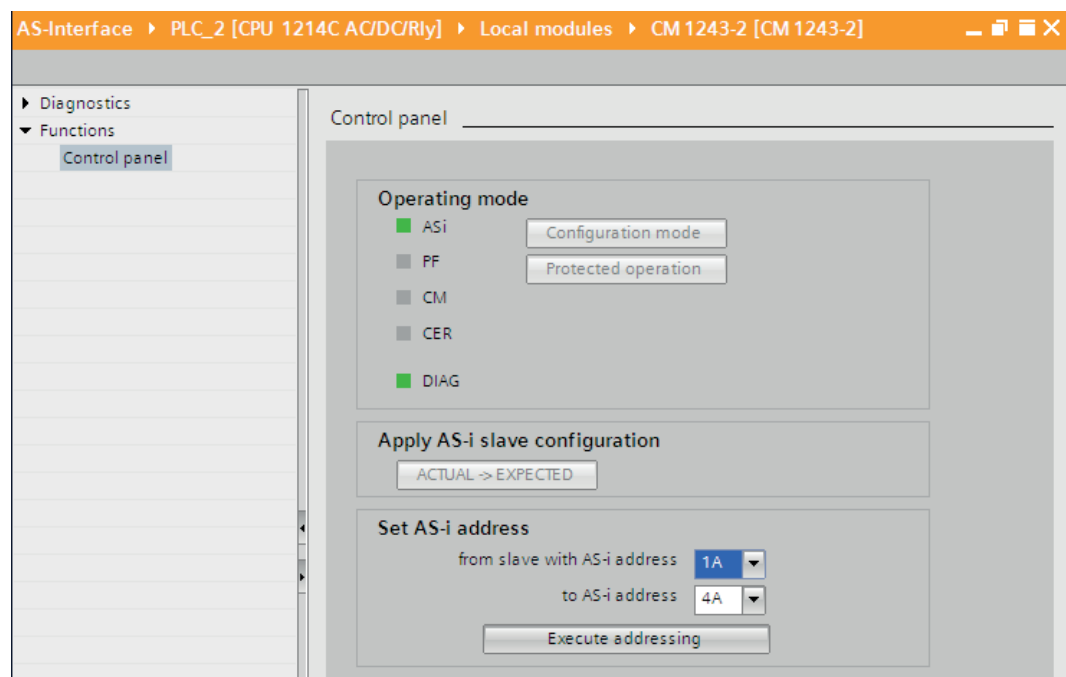
Prerequisite

The following preconditions must be satisfied to do this:

- The CPU must be in Stop.
- The AS-i master CM 1243-2 must be in configuration mode and must be connected to the bus. The correct addresses must have been assigned to the AS-i slaves.

Loading the slave configuration

The "ACTUAL -> PLANNED" button can be clicked in the window "Online" > "Diagnostics" to enable the AS-i master CM 1243-2 to load the configuration of the slaves connected to the master.



When the function is completed, the CER indication is switched off.

In protected mode the AS-i master CM 1243-2 then only exchanges I/O data with the detected AS-i slaves.

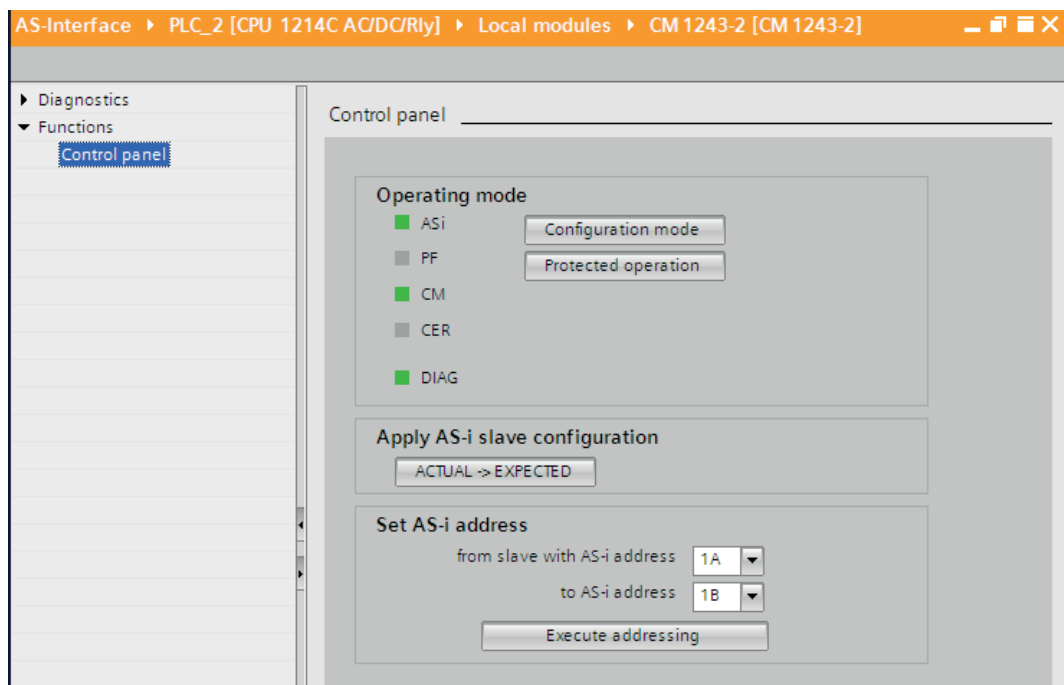
The following data of the AS-i slaves is saved in non-volatile memory in the AS-i master CM 1243-2:

- AS-i addresses
- ID codes
- I/O configuration

The button is deactivated if a slave configuration has already been loaded into the AS-i master CM 1243-2 or the CPU is in "RUN". You can activate the function "ACTUAL -> PLANNED" again, once you have reloaded the AS-i master CM 1243-2 with the basic configuration only - that is without configured AS-i slaves - in STEP 7.

5.4.4 Addressing an AS-i slave

A new address can be assigned to an AS-i slave using a selection menu and the button "Assign AS-i address" in the window "Online" > "Diagnostics". Only free AS-i addresses are available here.



Data exchange between the user program and AS-i slaves

6

In this section you will find information required to access the data of the AS-i slaves from the AS user program via the AS-i master CM 1243-2. This concerns the transfer of binary and analog values of the standard or A/B slaves via the AS I/O.

The logical addresses required for this purpose are indicated in STEP 7.

6.1 Transferring AS-i digital values

The S7-1200 CPU accesses the digital inputs and outputs of the AS-i slaves via the AS-i master CM 1243-2 in cyclic operation. The data is accessed via I/O addresses or by means of a data record transfer.

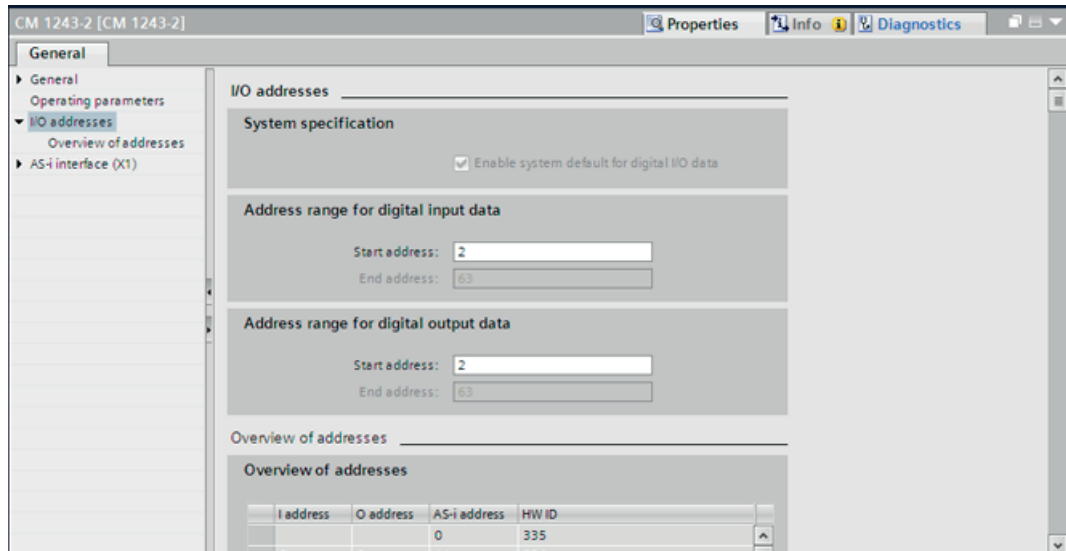
6.1.1 Addressing the AS-i slaves

Access to the bits of the AS-i slaves depends on whether the AS-i slaves were configured in STEP 7 or not.

Access without configuration of the AS-i slaves with STEP 7

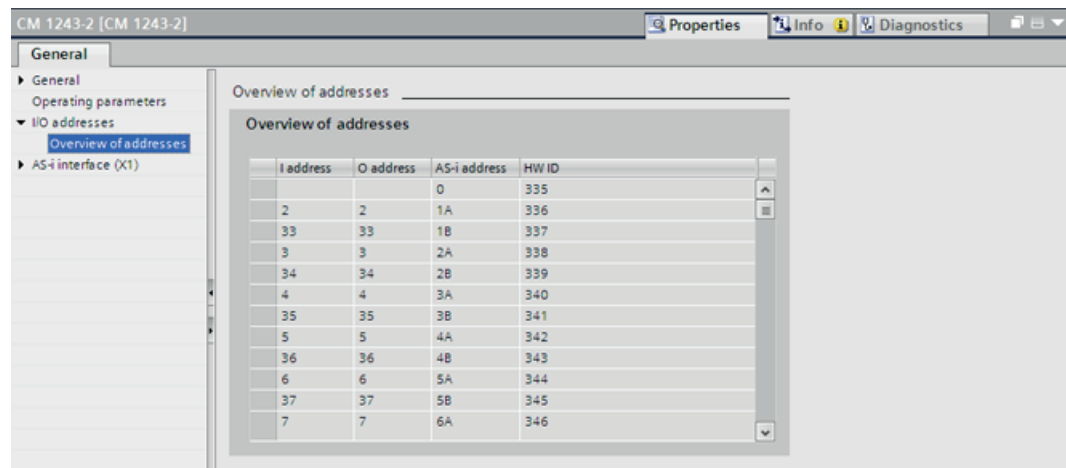
If you have not configured the AS-i slaves in STEP 7, you can access the AS-i digital values via the I/O area of the SIMATIC.

In this case STEP 7 automatically activates the "System assignment" parameter which causes a 62 byte long I/O area to be reserved in the SIMATIC. STEP 7 basic configuration (Page 38)



Within the I/O area, the digital data is accessed in bytes, i.e. one byte is assigned to each AS-i digital slave. In each case, one byte of output data and one byte of input data is reserved.

The assignment of the AS-i connections of the AS-i digital slaves to the data bits of the assigned byte is indicated in the inspector window of the AS-i master CM 1243-2:



The screenshot shows the 'Overview of addresses' window in the AS-i master CM 1243-2. The window contains a table with the following data:

I address	O address	AS-i address	HW ID
		0	335
2	2	1A	336
33	33	1B	337
3	3	2A	338
34	34	2B	339
4	4	3A	340
35	35	3B	341
5	5	4A	342
36	36	4B	343
6	6	5A	344
37	37	5B	345
7	7	6A	346

You can access the data of the AS-i slaves in the user program by means of the displayed I/O addresses with the appropriate bit logic operations (e.g. "AND") or bit assignments.

Access with configuration of the AS-i slaves with STEP 7

When you configure the AS-i slaves in STEP 7, the I/O address for accessing the data from the user program is displayed in the inspector window for the respective AS-i slave.

You can access the data of the AS-i slaves in the user program by means of the displayed I/O addresses with the appropriate bit logic operations (e.g. "AND") or bit assignments.

6.1.2 Special characteristics of Combined Transaction Type Slaves

If you are using the AS-i slaves in accordance with CTT1 ... 5, the "I/O bits" may be used for special transfer functions. For further details, please refer to the documentation of the respective AS-i slave.

The following applies to these protocol bits:

- In the input direction, the AS-i master CM 1243-2 sets the value "0".
- In the output direction, the AS-i master CM 1243-2 ignores the bits.

For a description of how to access the AS-i analog slaves, see section "Transferring AS-i analog values (Page 51)".

6.1.3 Special characteristics of AS-i Safety slaves

The AS-i master CM 1243-2 maps the following states in the process image of an input safety slave:

Table 6- 1 Process image of an input safety slave

Bit 3	Bit 2	Bit 1	Bit 0	Meaning
0	0	0	0	All contacts are open.
0	0	0	1	F-IN1 is closed.
0	1	0	0	F-IN2 is closed.
0	1	0	1	F-IN1 and F-IN2 are closed.

The signal state of the safe AS-i outputs is indicated by the AS-i master in the process image as follows.

Table 6- 2 Process image of output

Bit 3	Bit 2	Bit 1	Bit 0	Meaning
0	0	0	0	The safe AS-i output is to be deactivated.
1	1	1	1	The safe AS-i output is to be activated.

6.2 Cyclic transfer of the slave data in the process image

To access the AS-i slave data in the user program via simple commands (e.g. AND operations), corresponding input and output addresses are required.

If slave configuration has been performed, these addresses can be found in the inspector window for the respective slave.

If you have only performed basic configuration, you can find the addresses of the digital AS-i slaves in the properties dialog of the AS-i master.

Access to the values of analog AS-i slaves is only possible via the I/O commands if the AS-i slave was configured. In the case of basic configuration, you can only access the data via the data record interface (Accessing AS-i analog data via acyclic services (Page 52)).

See also

Transferring AS-i analog values (Page 51)

Loading the slave configuration (Page 45)

Using the data record interface (Page 55)

STEP 7 basic configuration (Page 38)

6.3 Transferring AS-i analog values

You can access analog data of an AS-i slave via cyclic services if you have configured this AS-i slave in STEP 7 as an analog slave (see section "Configuring AS-i slaves (Page 40)").

If you are not configuring any analog slaves, you can only access the data of the AS-i slave via the acyclic functions (see section "Accessing AS-i analog data via acyclic services (Page 52)").

Note

The following information is only applicable to AS-i slaves that process analog value transfer in accordance with the AS-i slave profile 7.3, 7.4, 7.5.5, 7.A.5, B.A.5, 7.A.A, 7.A.8, 7.A.9 or 6.0 (Combined Transaction Types CTT1 ... 5 according to AS-i Specification V3.0).

Analog value transfer according to the older AS-i slave profiles 7.1 and 7.2 is not supported by the AS-i master CM 1243-2.

The address of the analog slave is displayed in the inspector window of the slave.

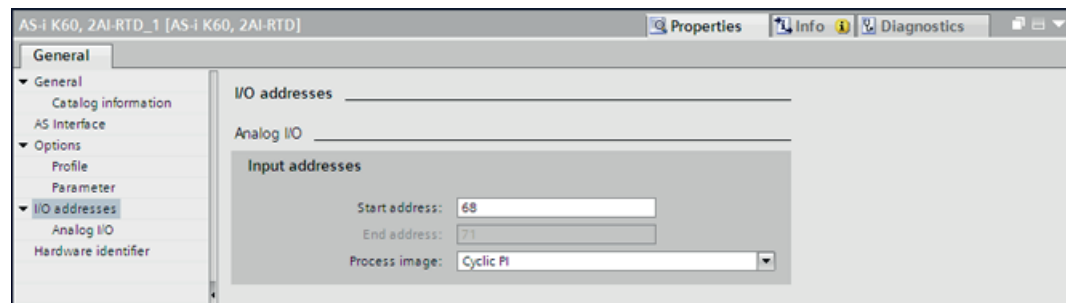


Figure 6-1 I/O address analog slave

SIMATIC S7 accesses analog data via word commands, e.g. using the comparator functions.

The address for accessing multi-channel analog AS-i slaves can be obtained from the table below:

Table 6- 3 Address area for the analog values of an AS-i slave

Byte no. (start address + offset)	Analog value channel
Start address + 0	Channel 1 / high byte
Start address + 1	Channel 1 / low byte
Start address + 2	Channel 2 / high byte
Start address + 3	Channel 2 / low byte
Start address + 4	Channel 3 / high byte
Start address + 5	Channel 3 / low byte
Start address + 6	Channel 4 / high byte
Start address + 7	Channel 4 / low byte

Representation of the analog values or the transparent values

The analog values are to be interpreted as 16-bit values in two's complement.

Information about the channel number and resolution is displayed for universal AS-i slaves in STEP 7 in the field "Configuration".

Information about the data framework of transparent I/O data is also displayed here. In this type of transfer, the data for the AS-i master is "transparent", i.e. it is transferred from the AS-i slave to the controller without interpretation of its contents.

For further information about the value range, measuring range and accuracy of the analog slaves as well as the meaning of transparent data, please refer to the respective documentation of the AS-i slaves.

6.3.1 Accessing AS-i analog data via acyclic services

If you want to access the data of an analog AS-i slave, but have not configured it in STEP 7 (see section "STEP 7 basic configuration (Page 38)"), you can use the data record interface (see section "Using the data record interface (Page 55)").

Before the AS-i master 1243-2 can exchange data with the non-configured AS-i slave, the function "ACTUAL -> PLANNED" must be performed in protected mode (Section "Loading the slave configuration (Page 45)").

Note

Write accessing of the analog data of an AS-i slave cannot be performed if the slave was configured using STEP 7.

6.3.2 Special cases in analog value transfer

- In the input direction, in the case of failure of a slave or faulty AS-i communication, the AS-i master CM 1243-2 sends a substitute value:
 - For analog slaves with the following profiles, the AS-i master CM 1243-2 transfers 7FFF_H as a substitute value:
 - 7.3.4 to 7.3.7
 - 7.3.B to 7.3.F
 - 7.4.1 to 7.4.F
 - 7.A.9
 - 7.A.8 (ID1 = 6)
 - 7.A.8 (ID1 = 7)
 - 7.A.5 and 7.5.5 and B.A.5 (with analog input)
 - For analog slaves with the following profiles, the AS-i master CM 1243-2 transfers 0000_H as a substitute value:
 - 7.3.0 to 7.3.3
 - 7.3.8 to 7.3.A
 - 7.A.A
 - 7.A.8 (ID1 = 3,4,5)
 - 7.A.5 and 7.5.5 and B.A.5 (with transparent input)
 - For all other analog slaves, the assigned analog value is 7FFF_H.
- In the output direction, on failure or when the PLC of the controller station is in "Stop", the AS-i master CM 1243-2 transfers logical "0" to all slaves.

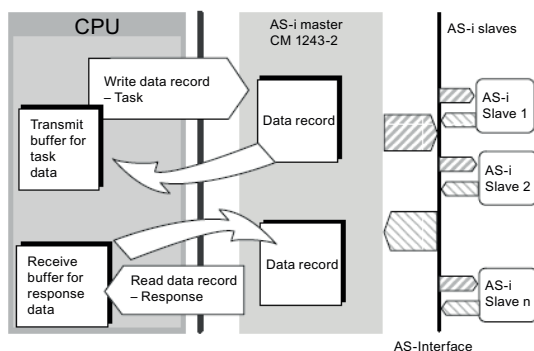
Using the data record interface

7.1 Data record interface of the AS-i master CM 1243-2

Meaning and function

With the help of the data record interface, you can completely control the response of the AS-i master via your user program.

AS-i calls are read and written via the acyclic services. In the user program of the CPU S7-1200 you can use the blocks "RDREC" (SFB 52, read data record) and "WRREC" (SFB 53, write data record) for this purpose - see the following table.



Calls

The following blocks are used for reading and writing data records:

Table 7- 1 Blocks for reading and writing data records

Call	In SIMATIC S7
Read data record	RDREC (SFB 52)
Write data record	WRREC (SFB 53)

You will find these blocks in STEP 7 in the operations list under "Advanced operations, distributed I/O"

Call parameters

The following parameters must be assigned to specify the task.

Table 7- 2 Parameters for reading / writing data records

SIMATIC S7 (blocks RDREC / WRREC)	
ID:	Hardware ID (HW ID) of the AS-i master CM 1243-2 or AS-i slave. <ul style="list-style-type: none"> • Call to an AS-i line: The hardware ID (HW ID) of the AS-i master CM 1243-2 must be specified here as a HEX value. • Call to an AS-i slave: The hardware ID (HW ID) of the required AS-i slave must be specified here as a HEX value.
INDEX:	Data record number, data format: INT
MLEN:	Length for "Read data record"
LEN:	Length for "Write data record"
RECORD:	Target range for the data record to be read / Source range for the data record to be written

Return value

The return values of the AS-i master CM 1243-2 can be evaluated in SIMATIC S7 using the blocks "RDREC" or "WRREC" in the user program. These blocks return a double word in which the "STATUS" output parameter contains the error information:

You can find information about RECREC and WRREC in the function block help of STEP 7.

Table 7- 3 Error Information

STATUS	Value for RDREC	Value for WRREC
STATUS[1]	DE _H	DF _H
STATUS[2]	80 _H	80 _H
STATUS[3]	A0 _H	A1 _H
STATUS[4]	see table below	

Device-specific errors of the AS-i master CM 1243-2 for the return value "Status"

Table 7- 4 Error code in "STATUS[4]" of the return values of the AS-i master CM 1243-2

STATUS[4]	Meaning
01 _H	Invalid CTT2 index
02 _H	Invalid CTT2 length
04 _H	CTT2 slave is temporarily busy.
05 _H	The requested AS-i slave was not found on the AS-Interface.
06 _H	An AS-i slave with address 0 exists.
07 _H	An AS-i slave with the new address already exists on the AS-Interface.
08 _H	The AS-i slave address cannot be deleted.
09 _H	Error while reading the Extended ID1 code
0A _H	The AS-i slave address cannot be set.
0B _H	The AS-i slave address cannot be permanently saved.
21 _H	The AS-i slave address is incorrect.
22 _H	The AS-i slave is not activated (not in LAS).
23 _H	Error on AS-Interface
24 _H	The command is not permitted in the current state of the AS-i master.
25 _H	An AS-i slave with address 0 exists.
26 _H	The AS-i slave has invalid configuration data (I/O or ID codes).
27 _H	The target address is not plausible (e.g. a B slave address is used for a standard slave).
2E _H	The call number or the call parameter is not known.
2F _H	The AS-i master has detected an EEPROM error.
31 _H	A length error has occurred on string transfer.
32 _H	A protocol error has occurred on string transfer.
33 _H	CTT2 slave not initialized. FFH unspecified error
C1 _H	Incorrect analog channel was used.
C2 _H	Insufficient memory.
C3 _H	Invalid or unknown slave detected.
C4 _H	Invalid parameters were used.
C5 _H	Invalid slave profile was used.
C6 _H	Standard slave is not permitted here because a B slave has already been assigned to this address.
C7 _H	Length invalid.
C8 _H	Invalid value
C9 _H	"Data exchange" is deactivated (data cannot be transferred to the slaves).
D2 _H	AS-i master is too busy (a command is already being executed).

7.2 Description of the AS-i line calls and AS-i slave calls

7.2.1 Description of the AS-i line calls and AS-i slave calls

Overview

The calls that the CPU of the S7 1200 can issue to the AS-i master CM 1243-2 are described below. With these calls, the AS-i master CM 1243-2 makes the complete functional scope of the master profile M4 available to the AS-i master specification.

The calls that can be executed are listed in the following tables:

- The table "AS-i line calls" contains the calls for the "AS-i line" level.
- The table "AS-i slave calls" contains the calls for the "AS-i slave" level.
- The table "AS-i slave calls for slaves according to AS-i specification V3.0 (CTT1, CTT2)" contains the calls for the "AS-i slave" level, which are only supported by slaves according to AS-i specification V3.0 (CTT slaves).

Table 7- 5 AS-i line calls

Name	Function	Index (decimal)	Data in the send or receive buffer	Description in section:
Configuring actual parameter values (Store_Actual_Parameters)	Write	7	-	"Configuring actual parameter values (Store_Actual_Parameters) (Page 61)"
Configuring actual configuration data (Store_Actual_Configuration)	Write	10 / 93	-	"Configuring actual configuration data (Store_Actual_Configuration) (Page 62)"
Configure LPS (Set_LPS)	Write	12	LPS	"Configure LPS (Set_LPS) (Page 63)"
Read lists and flags (Get_LPS_LAS_LDS_LPF_Flags)	Read	84	LPS, LAS, LDS, LPF, flags	"Read lists and flags (Get_LPS_LAS_LDS_LPF_Flags) (Page 64)"
Read complete configuration (Get_LAS_CDI_PI_Flags)	Read	85	Complete configuration (LAS, CDI, parameter), flags	"Read complete configuration (Get_LAS_CDI_PI_Flags) (Page 67)"
Configure complete configuration (Set_LPS_PCD_PP_Flags)	Write	86	Complete configuration (LPS, PCD, parameters), flags	"Configure complete configuration (Set_LPS_PCD_PP_Flags) (Page 70)"
Set operating mode (Set_Operation_Mode)	Write	17	Mode	"Set operating mode (Set_Operation_Mode) (Page 73)"
Set offline mode (Set_Offline_Mode)	Write	18	Mode	"Set offline mode (Set_Offline_Mode) (Page 74)"
Change AS-i slave address (Change_Slave_Address)	Write	20	Slave addresses	"Change AS-i slave address (Change_Slave_Address) (Page 75)"

Name	Function	Index (decimal)	Data in the send or receive buffer	Description in section:
Select automatic address enable (Set_Auto_Addr_Enable)	Write	21	Mode	"Automatic address programming (Set_Auto_Addr_Enable) (Page 76)"
Write AS-i slave extended ID1 (Write_Extended_ID-Code_1)	Write	24	ID1 code	"Write AS-i slave extended ID1 (Write_Extended_ID-Code_1) (Page 77)"
Read AS-i line analog input data (Read_AIDI)	Read	25	Analog input data	"Read AS-i line analog input data (Read_AIDI) (Page 78)"
Write AS-i line analog output data (Write_AODI)	Write	26	Analog output data	"Write AS-i line analog output data (Write_AODI) (Page 80)"

Table 7-6 AS-i slave calls

Name	Function	Index (decimal)	Data in the send or receive buffer	Description
Configure parameter value (Set_Permanent_Parameter)	Write	3	Parameter value	"Configure parameter value (Set_Permanent_Parameter) (Page 81)"
Read configured parameter value (Get_Permanent_Parameter)	Read	4	Parameter value	"Read configured parameter value (Get_Permanent_Parameter) (Page 82)"
Write parameter value (Write_Parameter)	Write	5	Parameter value	"Write parameter value (Write_Parameter) (Page 83)"
Read parameter value (Read_Parameter)	Read	6	Parameter value	"Read parameter value (Read_Parameter) (Page 84)"
Configure configuration data (Set_Permanent_Configuration)	Write	8	Configuration	"Configure configuration data (Set_Permanent_Configuration) (Page 84)"
Read configuration data (Get_Permanent_Configuration)	Read	9	Configuration	"Read configuration data (Get_Permanent_Configuration) (Page 85)"
Read actual configuration data (Read_Actual_Configuration)	Read	11	Configuration	"Read actual configuration data (Read_Actual_Configuration) (Page 86)"
Read AS-i slave I/O (Read_I/O_Configuration)	Read	33	I/O configuration	"Read AS-i slave I/O (Read_I/O_Configuration) (Page 93)"
Read AS-i slave ID (Read_ID-Code)	Read	34	ID code	"Read AS-i slave ID (Read_ID-Code) (Page 93)"
Read AS-i slave extended ID1 (Read_Extended_ID-Code_1)	Read	24	ID1 code	"Read AS-i slave extended ID1 (Read_Extended_ID-Code_1) (Page 94)"
Read AS-i slave extended ID2 (Read_Extended_ID-Code_2)	Read	35	ID2 code	"Read AS-i slave extended ID2 (Read_Extended_ID-Code_2) (Page 94)"

7.2 Description of the AS-i line calls and AS-i slave calls

Name	Function	Index (decimal)	Data in the send or receive buffer	Description
Read AS-i slave status (Read_Status)	Read	80	Status of the AS-i slave (error flags)	"Read AS-i slave status (Read_Status) (Page 95)"
Read parameter echo (Get_Write_Parameter_Echo)	Read	81	Parameter echo value	"Read parameter echo (Get_Write_Parameter_Echo) (Page 96)"
Write AS-i slave analog output data (Write_Analog_Output_Data)	Write	82	Analog output data of the AS-i slave	"Write AS-i slave analog output data (Write_Analog_Output_Data) (Page 97)"
Read AS-i slave analog input data (Read_Analog_Input_Data)	Read	83	Analog input data of the AS-i slave	"Read AS-i slave analog input data (Read_Analog_Input_Data) (Page 98)"

Table 7-7 AS-i slave calls for slaves according to AS-i specification V3.0 (CTT1, CTT2)

Name	Function	Index (decimal)	Data in the send or receive buffer	Description
Read AS-i slave parameter string (Read_Parameter_String)	Read	27	Parameter string	"Read AS-i slave parameter string (Read_Parameter_String) (Page 87)"
Write AS-i slave parameter string (Write_Parameter_String)	Write	28	Parameter string	"Write AS-i slave parameter string (Write_Parameter_String) (Page 88)"
Read AS-i slave diagnostics string (Read_Diagnostic_String)	Read	29	Diagnostics string	"Read AS-i slave diagnostics string (Read_Diagnostic_String) (Page 89)"
Read AS-i slave ID string (Read_Identification_String)	Read	30	ID string	"Read AS-i slave ID string (Read_Identification_String) (Page 90)"
Write CTT2 request (Write_CTT2_String)	Write	31	CTT2 string	"Write CTT2 request (Write_CTT2_String) (Page 91)"
Read CTT2 request (Read_CTT2_String)	Read	31	CTT2 string	"Read CTT2 request (Read_CTT2_String) (Page 92)"

7.2.2 AS-i line calls

7.2.2.1 Configuring actual parameter values (Store_Actual_Parameters)

Meaning

With this call, the current parameters of the AS-i slave are written from the volatile memory of the AS-i master CM 1243-2 to its retentive memory.

In the factory setting, the bits of the AS-i slave parameters in the AS-i master CM 1243-2 are all assigned the value 1.

The following information must be transferred to the "WRREC" instruction as parameters.

- INDEX:7
- RECORD:2 bytes

Table 7- 8 Structure of the utility WRREC - Index 7

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0000 _H							
1	0000 _H							

You can find information about "Parameters" and the ID codes for the "Configuration" (I/O configuration, ID code, ID1 code, and ID2 code) in the manual "AS-Interface – Introduction and Basic Information" (Order No: 6GK1 971-2SA01-0AA0). The manual is available on the Internet (<http://support.automation.siemens.com/WWW/view/en/5581657>).

Exceptions

There are a few AS-i slave types for which the AS-i master administers the slave parameterization itself. The configured parameters for these AS-i slaves are always equal to F_H.

7.2.2.2 Configuring actual configuration data (Store_Actual_Configuration)

Meaning

With this call, the (ACTUAL) configuration data of all AS-i slaves determined in the AS-Interface (I/O configuration, ID code, ID1 code, and ID2 code) are stored in non-volatile memory as (PLANNED) configuration data. The list of activated AS-i slaves (LAS) is also accommodated into the list of configured AS-i slaves (LPS).

When this call is executed, the AS-i master CM 1243-2 switches to the offline phase and switches back to normal mode again (restart of the AS-i line).

The function can be called using two different data records: If Index 10 is used, the call is performed only if the AS-i master is in the configuration mode.

If Index 93 is used, the call is performed also in protected mode.

Independent of the index used, the function cannot be performed when an AS-i slave configuration has already been specified with STEP 7 and loaded into the AS-i master.

Two bytes of version information must be transferred as useful data for the utility WRREC - Index 10 / 93. These two bytes must be filled with "0".

Table 7- 9 Structure of the utility WRREC - Index 10 / 93

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							

You can find information about "Parameters" and the ID codes for the "Configuration" (I/O configuration, ID code, ID1 code, and ID2 code) in the manual "AS-Interface – Introduction and Basic Information" (Order No: 6GK1971-2SA01-0AA0). The manual is available on the Internet (<http://support.automation.siemens.com/WW/view/de/1171856/0/en>).

7.2.2.3 Configure LPS (Set_LPS)

Meaning

This call transfers the list of configured AS-i slaves for non-volatile storage in the master. When this call is executed, the AS-i master CM 1243-2 switches to the offline phase and switches back to normal mode again (restart of the AS-i line).

This call is not executed in protected mode.

The function cannot be performed when an AS-i slave configuration has already been loaded from STEP 7 into the AS-i master CM 1243-2.

Structure of the utility WRREC – Index 12

Byte	Meaning							
	Bit 9	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Slave 7/7A	Slave 6/6A	Slave 5/5A	Slave 4/4A	Slave 3/3A	Slave 2/2A	Slave 1/1A	Slave 0/0A
3	Slave 15/15A	Slave 14/14A	Slave 13/13A	Slave 12/12A	Slave 11/11A	Slave 10/10A	Slave 9/9A	Slave 8/8A
4	Slave 23/23A	Slave 22/22A	Slave 21/21A	Slave 20/20A	Slave 19/19A	Slave 18/18A	Slave 17/17A	Slave 16/16A
5	Slave 31/31A	Slave 30/30A	Slave 29/29A	Slave 28/28A	Slave 27/27A	Slave 26/26A	Slave 25/25A	Slave 24/24A
6	Slave 7B	Slave 6B	Slave 5B	Slave 4B	Slave 3B	Slave 2B	Slave 1B	Slave 0B
7	Slave 15B	Slave 14B	Slave 13B	Slave 12B	Slave 11B	Slave 10B	Slave 9B	Slave 8B
8	Slave 23B	Slave 22B	Slave 21B	Slave 20B	Slave 19B	Slave 18B	Slave 17B	Slave 16B
9	Slave 31B	Slave 30B	Slave 29B	Slave 28B	Slave 27B	Slave 26B	Slave 25B	Slave 24B
10	Reserved 0x0000							
11								

7.2.2.4 Read lists and flags (Get_LPS_LAS_LDS_LPF_Flags)

Meaning

The following entries are read from the AS-i master CM 1243-2 with this call:

- List of configured AS-i slaves LPS
- List of activated AS-i slaves LAS
- List of detected AS-i slaves LDS
- List of active I/O faults for the activated AS-i slaves LPF
- Flags in accordance with the AS-i slave specification

Structure of the response data of the utility RDREC – Index 84

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_hi = 0x00							
2	LAS Slave 7/7A	LAS Slave 6/6A	LAS Slave 5/5A	LAS Slave 4/4A	LAS Slave 3/3A	LAS Slave 2/2A	LAS Slave 1/1A	LAS Slave 0/0A
3	LAS Slave 15/15A	LAS Slave 14/14A	LAS Slave 13/13A	LAS Slave 12/12A	LAS Slave 11/11A	LAS Slave 10/10A	LAS Slave 9/9A	LAS Slave 8/8A
4	LAS Slave 23/23A	LAS Slave 22/22A	LAS Slave 21/21A	LAS Slave 20/20A	LAS Slave 19/19A	LAS Slave 18/18A	LAS Slave 17/17A	LAS Slave 16/16A
5	LAS Slave 31/31A	LAS Slave 30/30A	LAS Slave 29/29A	LAS Slave 28/28A	LAS Slave 27/27A	LAS Slave 26/26A	LAS Slave 25/25A	LAS Slave 24/24A
6	LAS Slave 7B	LAS Slave 6B	LAS Slave 5B	LAS Slave 4B	LAS Slave 3B	LAS Slave 2B	LAS Slave 1B	LAS Slave 0B
7	LAS Slave 15B	LAS Slave 14B	LAS Slave 13B	LAS Slave 12B	LAS Slave 11B	LAS Slave 10B	LAS Slave 9B	LAS Slave 8B
8	LAS Slave 23B	LAS Slave 22B	LAS Slave 21B	LAS Slave 20B	LAS Slave 19B	LAS Slave 18B	LAS Slave 17B	LAS Slave 16B
9	LAS Slave 31B	LAS Slave 30B	LAS Slave 29B	LAS Slave 28B	LAS Slave 27B	LAS Slave 26B	LAS Slave 25B	LAS Slave 24B
10	LDS Slave 7/7A	LDS Slave 6/6A	LDS Slave 5/5A	LDS Slave 4/4A	LDS Slave 3/3A	LDS Slave 2/2A	LDS Slave 1/1A	LDS Slave 0/0A
11	LDS Slave 15/15A	LDS Slave 14/14A	LDS Slave 13/13A	LDS Slave 12/12A	LDS Slave 11/11A	LDS Slave 10/10A	LDS Slave 9/9A	LDS Slave 8/8A
12	LDS Slave 23/23A	LDS Slave 22/22A	LDS Slave 21/21A	LDS Slave 20/20A	LDS Slave 19/19A	LDS Slave 18/18A	LDS Slave 17/17A	LDS Slave 16/16A

7.2 Description of the AS-i line calls and AS-i slave calls

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

7.2 Description of the AS-i line calls and AS-i slave calls

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
32	LPF Slave 23B	LPF Slave 22B	LPF Slave 21B	LPF Slave 20B	LPF Slave 19B	LPF Slave 18B	LPF Slave 17B	LPF Slave 16B
33	LPF Slave 31B	LPF Slave 30B	LPF Slave 29B	LPF Slave 28B	LPF Slave 27B	LPF Slave 26B	LPF Slave 25B	LPF Slave 24B
34	Flag 1							
35	Flag 2							

Meaning of the bits in Byte 0 to Byte 33

- Bit = 0:
 - LAS (Byte 2 ... 9): The AS-i slave is not activated
 - LDS (Byte 10 ... 17): The AS-i slave was not detected
 - LPS (Byte 18 ... 25): The AS-i slave is not configured
 - LPF (Byte 26 ... 33): The AS-i slave signals no I/O fault
- Bit = 1:
 - LAS (Byte 2 ... 9): The AS-i slave is activated
 - LDS (Byte 10 ... 17): The AS-i slave has been detected
 - LPS (Byte 18 ... 25): The AS-i slave is configured
 - LPF (Byte 26 ... 33): The AS-i slave signals I/O faults

Flag 1		Flag 2	
Bit	Meaning	Bit	Meaning
0	CONFIG_OK	0	PERIPHERY_OK
1	LDS_0	1	DATA_EXCHANGE_ACTIVE
2	AUTO_ADDR_ASSIGN	2	OFFLINE
3	AUTO_ADDR_AVAIL	3	AUTO_ADDR_ENABLE
4	OPERATING MODE	4	Reserved
5	NORMAL_OPERATION	5	EPROM_OK
6	APF	6	Reserved
7	OFFLINE_READY	7	Reserved

Meaning of the flags

Flag	Meaning
CONFIG_OK	The flag is set when the planned configuration (configured) and the actual configuration match.
LDS_0	The flag is set if an AS-i slave with operating address 0 is available.
AUTO_ADDR_ASSIGN	The flag is set if automatic address programming is possible (i.e. SET_AUTO_ADDR_ENABLE = 1 and no "incorrect" AS-i slave is connected to AS-Interface).
AUTO_ADDR_AVAIL	The flag is set if automatic address programming can be performed (i.e. exactly one AS-i slave has currently failed).
OPERATING MODE	The flag is set in configuration mode and reset in protected mode.
NORMAL_OPERATION	The flag is set when the AS-i master CM 1243-2 is in normal operation. (The flag is set when the link is in normal operation)
APF	The flag is set if the voltage on the AS-i cable is too low.
OFFLINE_READY	The flag is set if the offline phase is active.
PERIPHERY_OK	The flag is set if at least one AS-i slave signals a peripheral fault.
DATA_EXCHANGE_ACTIVE	The flag "DATA_EXCHANGE_ACTIVE" is set when cyclic data traffic is in normal operation.
OFFLINE	The flag is set if the operating status OFFLINE is to be adopted or has already been adopted.
AUTO_ADDR_ENABLE	The flag indicates whether automatic address programming by the user is disabled (BIT = 0) or enabled (BIT = 1).
EPROM_OK	The flag is set if the EPROM of the device is OK.

7.2.2.5 Read complete configuration (Get_LAS_CDI_PI_Flags)

Meaning

The following data is read from the AS-i master CM 1243-2 with this call:

- The list of active AS-i slaves (LAS). It specifies which of the connected AS-i slaves are activated.
- The current configuration data of the connected AS-i slaves (I/O configuration, ID code, ID1 code, ID2 code);
- The current parameters of the AS-i slaves (actual parameters);
- The current flags.

The call can be used, for example, to determine the configuration of the stations connected to the AS-i cable after commissioning.

These read-in configuration data can be modified if required and stored in the AS-i master CM 1243-2 as the planned configuration with the command "Configure complete configuration" (see section "Configure complete configuration (Set_LPS_PCD_PP_Flags) (Page 70)").

Structure of the response data of the utility RDREC – Index 85

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_hi = 0x00							
2	LAS Slave 7/7A	LAS Slave 6/6A	LAS Slave 5/5A	LAS Slave 4/4A	LAS Slave 3/3A	LAS Slave 2/2A	LAS Slave 1/1A	LAS Slave 0/0A
3	LAS Slave 15/15A	LAS Slave 14/14A	LAS Slave 13/13A	LAS Slave 12/12A	LAS Slave 11/11A	LAS Slave 10/10A	LAS Slave 9/9A	LAS Slave 8/8A
4	LAS Slave 23/23A	LAS Slave 22/22A	LAS Slave 21/21A	LAS Slave 20/20A	LAS Slave 19/19A	LAS Slave 18/18A	LAS Slave 17/17A	LAS Slave 16/16A
5	LAS Slave 31/31A	LAS Slave 30/30A	LAS Slave 29/29A	LAS Slave 28/28A	LAS Slave 27/27A	LAS Slave 26/26A	LAS Slave 25/25A	LAS Slave 24/24A
6	LAS Slave 7B	LAS Slave 6B	LAS Slave 5B	LAS Slave 4B	LAS Slave 3B	LAS Slave 2B	LAS Slave 1B	LAS Slave 0B
7	LAS Slave 15B	LAS Slave 14B	LAS Slave 13B	LAS Slave 12B	LAS Slave 11B	LAS Slave 10B	LAS Slave 9B	LAS Slave 8B
8	LAS Slave 23B	LAS Slave 22B	LAS Slave 21B	LAS Slave 20B	LAS Slave 19B	LAS Slave 18B	LAS Slave 17B	LAS Slave 16B
9	LAS Slave 31B	LAS Slave 30B	LAS Slave 29B	LAS Slave 28B	LAS Slave 27B	LAS Slave 26B	LAS Slave 25B	LAS Slave 24B
10	I/O configuration Slave 0				ID_CODE Slave 0			
11	ID1_Code Slave 0				ID2_Code Slave 0			
12	I/O configuration Slave 1				ID_CODE Slave 1			
13	ID1_Code Slave 1				ID2_Code Slave 1			
...			
72	I/O configuration Slave 31				ID_CODE Slave 31			
73	ID1_Code Slave 31				ID2_Code Slave 31			
74	Reserved 0x0000							
75	Reserved 0x0000							
76	I/O configuration Slave 1B				ID_CODE Slave 1B			
77	ID1_Code Slave 1B				ID2_Code Slave 1B			
78	I/O configuration Slave 2B				ID_CODE Slave 2B			
79	ID1_Code Slave 2B				ID2_Code Slave 2B			
...			
136	I/O configuration Slave 31B				ID_CODE Slave 31B			
137	ID1_Code Slave 31B				ID2_Code Slave 31B			
138	Reserved 0x00				Parameter Slave 1/1A			
139	Parameter 2/2A				Parameter 3/3A			
	P3	P2	P1	P0	P3	P2	P1	P0
...			

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
153	Parameter 30/30A				Parameter 31/31A			
	P3	P2	P1	P0	P3	P2	P1	P0
154	Reserved 0x00				Parameter 1B			
					P3	P3	P3	P3
155	Parameter 2B				Parameter 3B			
	P3	P2	P1	P0	P3	P2	P1	P0
...			
169	Parameter 30B				Parameter 31B			
	P3	P2	P1	P0	P3	P2	P1	P0
170	Flag 1							
171	Flag 2							

Flag 1		Flag 2	
Bit	Meaning	Bit	Meaning
0	CONFIG_OK	0	PERIPHERY_OK
1	LDS_0	1	DATA_EXCHANGE_ACTIVE
2	AUTO_ADDR_ASSIGN	2	OFFLINE
3	AUTO_ADDR_AVAIL	3	AUTO_ADDR_ENABLE
4	OPERATING MODE	4	Reserved
5	NORMAL_OPERATION	5	EPROM_OK
6	APF	6	Reserved
7	OFFLINE_READY	7	Reserved

Reference

The meaning of the flags is the same as for the job "Read lists and flags" (Get_LPS_LAS_LDS_LPF_Flags, section "Read lists and flags (Get_LPS_LAS_LDS_LPF_Flags) (Page 64)").

7.2.2.6 Configure complete configuration (Set_LPS_PCD_PP_Flags)

Meaning

With this call, the desired overall configuration of the AS-Interface is transferred to the AS-i master CM 1243-2 and stored in non-volatile memory as the planned configuration. This configures the AS-i master CM 1243-2.

Specifically, the following data are transferred:

- The list of configured AS-i slaves that defines which AS-i slaves may be activated by the AS-i master CM 1243-2 in protected mode;
- The list of configuration data which specifies which ID codes and which I/O configuration the connected AS-i slaves must have;
- The list of the AS-i slave parameters that have been configured in the AS-i master CM 1243-2 and stored in non-volatile memory. These parameters are transferred to the AS-i slaves when the AS-i master CM 1243-2 starts up;
- The flags that determine the operating state of the AS-i master CM 1243-2 after startup.

Exceptions

There are a few AS-i slave types for which the AS-i master CM 1243-2 administers the slave parameterization itself. The configured parameters for these AS-i slaves are always equal to F_H . The parameter values specified in the call are ignored by the AS-i master CM 1243-2 for these slave types.

The function cannot be performed when an AS-i slave configuration has already been loaded from STEP 7 into the AS-i master CM 1243-2.

Structure of the utility WRREC – Index 86

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_hi = 0x00							
2	LAS Slave 7/7A	LAS Slave 6/6A	LAS Slave 5/5A	LAS Slave 4/4A	LAS Slave 3/3A	LAS Slave 2/2A	LAS Slave 1/1A	LAS Slave 0/0A
3	LAS Slave 15/15A	LAS Slave 14/14A	LAS Slave 13/13A	LAS Slave 12/12A	LAS Slave 11/11A	LAS Slave 10/10A	LAS Slave 9/9A	LAS Slave 8/8A
4	LAS Slave 23/23A	LAS Slave 22/22A	LAS Slave 21/21A	LAS Slave 20/20A	LAS Slave 19/19A	LAS Slave 18/18A	LAS Slave 17/17A	LAS Slave 16/16A
5	LAS Slave 31/31A	LAS Slave 30/30A	LAS Slave 29/29A	LAS Slave 28/28A	LAS Slave 27/27A	LAS Slave 26/26A	LAS Slave 25/25A	LAS Slave 24/24A
6	LAS Slave 7B	LAS Slave 6B	LAS Slave 5B	LAS Slave 4B	LAS Slave 3B	LAS Slave 2B	LAS Slave 1B	LAS Slave 0B
7	LAS Slave 15B	LAS Slave 14B	LAS Slave 13B	LAS Slave 12B	LAS Slave 11B	LAS Slave 10B	LAS Slave 9B	LAS Slave 8B
8	LAS Slave 23B	LAS Slave 22B	LAS Slave 21B	LAS Slave 20B	LAS Slave 19B	LAS Slave 18B	LAS Slave 17B	LAS Slave 16B
9	LAS Slave 31B	LAS Slave 30B	LAS Slave 29B	LAS Slave 28B	LAS Slave 27B	LAS Slave 26B	LAS Slave 25B	LAS Slave 24B
10	I/O configuration Slave 0				ID_CODE Slave 0			
11	ID1_Code Slave 0				ID2_Code Slave 0			
12	I/O configuration Slave 1				ID_CODE Slave 1			
13	ID1_Code Slave 1				ID2_Code Slave 1			
...			
72	I/O configuration Slave 31				ID_CODE Slave 31			
73	ID1_Code Slave 31				ID2_Code Slave 31			
74	Reserved 0x0000							
75	Reserved 0x0000							
76	I/O configuration Slave 1B				ID_CODE Slave 1B			
77	ID1_Code Slave 1B				ID2_Code Slave 1B			
78	I/O configuration Slave 2B				ID_CODE Slave 2B			
79	ID1_Code Slave 2B				ID2_Code Slave 2B			
...			
136	I/O configuration Slave 31B				ID_CODE Slave 31B			
137	ID1_Code Slave 31B				ID2_Code Slave 31B			
138	Reserved 0x00				Parameter Slave 1/1A			
139	Parameter 2/2A				Parameter 3/3A			
	P3	P2	P1	P0	P3	P2	P1	P0
...			

7.2 Description of the AS-i line calls and AS-i slave calls

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
153	Parameter 30/30A				Parameter 31/31A			
	P3	P2	P1	P0	P3	P2	P1	P0
154	Reserved 0x00				Parameter 1/1B			
					P3	P3	P3	P3
155	Parameter 2/2B				Parameter 3/3B			
	P3	P2	P1	P0	P3	P2	P1	P0
...			
169	Parameter 30/30B				Parameter 31/31B			
	P3	P2	P1	P0	P3	P2	P1	P0
170	Flag 1							
171	Flag 2							

Flag 1		Flag 2	
Bit	Meaning	Bit	Meaning
0	CONFIG_OK	0	PERIPHERY_OK
1	LDS_0	1	DATA_EXCHANGE_ACTIVE
2	AUTO_ADDR_ASSIGN	2	OFFLINE
3	AUTO_ADDR_AVAIL	3	<i>AUTO_ADDR_ENABLE</i>
4	<i>OPERATING MODE</i>	4	Reserved
5	NORMAL_OPERATION	5	EPROM_OK
6	APF	6	Reserved
7	OFFLINE_READY	7	Reserved

In the table, the lines of those flags whose values change the operating mode of the AS-i master CM 1243-2 (OPERATING MODE, AUTO_ADDR_ENABLE) are shown in *italics*.

The values of the remaining flags are insignificant for the call "Configure complete configuration" and cannot be modified in the AS-i master CM 1243-2 by this call.

The flags have the same meaning as for the call "Read lists and flags (Get_LPS_LAS_LDS_LPF_Flags) (Page 64)".

7.2.2.7 Set operating mode (Set_Operation_Mode)

Meaning

You can choose between "Configuration mode" and "Protected mode" with this call.

In protected mode (operating mode), only those AS-i slaves are activated that are marked in the LPS and whose actual and planned configurations match, i.e. if the I/O configuration and the ID codes of the detected AS-i slaves are identical to the configured values.

In configuration mode, all the detected AS-i slaves are activated (with the exception of AS-i slave "0"). AS-i slaves which differ in their actual and planned configurations are also activated.

The bit "OPERATING MODE" is saved in non-volatile memory, i.e. its setting is retained even after start-up / restart.

The following bit assignment applies to the operating mode:

- Protected mode: "0"
- Configuration mode: "1"

On changeover from configuration mode to protected mode, the AS-i master is restarted (transition to the offline phase and subsequent changeover to online mode).

Note

If an AS-i slave with the operating address 0 is entered in the LDS, the AS-i master CM 1243-2 cannot switch from configuration mode to protected mode.

Structure of the utility WRREC – Index 17

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0	0	0	0	0	0	0	Mode
3	Reserved 0x00							

7.2.2.8 Set offline mode (Set_Offline_Mode)

Meaning

This call switches between online and offline mode.

Online mode

Online mode is the normal mode for the AS-i master. The following jobs are processed cyclically here:

- In the "data exchange phase", the fields of the output data are transferred to the slave outputs for all activated AS-i slaves. In error-free transmission, the addressed AS-i slaves transfer the values of the slave inputs to the master.
- This is followed by the "acceptance phase" in which a search is made for the available AS-i slaves and newly added AS-i slaves are accepted into the LDS or LAS.
- In the "management phase", jobs forwarded by the user, such as writing parameters, are executed.

Offline mode

In offline mode, the AS-i master CM 1243-2 only processes calls from the user. Calls that immediately activate an AS-i slave are rejected with an error. Cyclic data exchange is not performed with the AS-i slaves.

Bit assignment

The following bit assignment applies to online/offline mode:

- Online mode: "0"
- Offline mode: "1"

The bit OFFLINE = TRUE is not permanently stored, i.e. following a start/restart, the AS-i master CM 1243-2 returns to online mode.

Structure of the utility WRREC – Index 18

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0	0	0	0	0	0	0	Mode
3	Reserved 0x00							

7.2.2.9 Change AS-i slave address (Change_Slave_Address)

Meaning

This call can be used to change the AS-i address of an AS-i slave.

This call is used predominantly for adding a new AS-i slave with the default address "0" to the AS-Interface. In this case, the address is changed from the "AS-i slave address, old" (= 0) to the "AS-i slave address, new".

The change is only executed if the following conditions are met:

1. An AS-i slave with the "AS-i slave address, old" must exist.
2. When changing the AS-i slave address, the address is initially set to "0". No other slave with the address "0" may be connected.
3. "AS-i slave address, new" must have a valid value.
4. An AS-i slave with "AS-i slave address, new" must not already exist.

Structure of the utility WRREC – Index 20

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	AS-i address old							
3	AS-i address new							

To address slaves with a "B" address, you must add the value "32" to the AS-i address. Example: The AS-i slave with address "1B" must be changed to address "2B". In this case, the value "33" must be transferred as "AS-i address old" and the value "34" as "AS-i address new".

7.2.2.10 Automatic address programming (Set_Auto_Addr_Enable)

Meaning

The function "Automatic address programming" can be enabled or disabled for the AS-i slave of a line with this call (see also section "Replacing a defective AS-i slave / automatic address programming (Page 105)").

- Mode = 0: Automatic address programming disabled
- Mode = 1: Automatic address programming enabled

The bit "Set_Auto_Addr_Enable" is saved in non-volatile memory, i.e. its setting is retained even after start-up/restart of the AS-i master.

Structure of the utility WRREC – Index 21

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0	0	0	0	0	0	0	Mode
3	Reserved 0x00							

7.2.2.11 Write AS-i slave extended ID1 (Write_Extended_ID-Code_1)

Meaning

The extended ID1 code of an AS-i slave with the address "0" can be directly written via the AS-i cable with this call.

The AS-i master forwards the extended ID1 code to the AS-i slave without validity check. The ID1 code is stored in the AS-i slave in non-volatile memory. In the AS-i master, the ID1 code is stored in CDI (RAM) non-retentively.

Structure of the utility WRREC – Index 24

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				ID1 code			
3	Reserved 0x00							

7.2.2.12 Read AS-i line analog input data (Read_AIDI)

Meaning

This call reads out the process image of the analog input data of the AS-i line of an AS-i master.

Structure of the utility RDREC – Index 25

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Slave 1, Channel 1 or Slave 1A, Channel 1							
3								
4	Slave 1, Channel 2 or Slave 1A, Channel 2							
5								
6	Slave 1, Channel 3 or Slave 1B, Channel 1							
7								
8	Slave 1, Channel 4 or Slave 1B, Channel 2							
9								
...	...							
...								
242	Slave 31, Channel 1 or Slave 31A, Channel 1							
243								
244	Slave 31, Channel 2 or Slave 31A, Channel 2							
245								
246	Slave 31, Channel 3 or Slave 31B, Channel 1							
247								
248	Slave 31, Channel 4 or Slave 31B, Channel 2							
249								

Mapping of the analog values in the data record on accessing the complete line

You can use analog value access to the complete AS-i line to save I/O address space in the S7 station.

For each slave address, an area of 8 bytes is used to administer four analog channels. The table below shows the address area of the data record into which the analog values from a specific AS-i slave are transferred.

The table applies equally to the analog input area and to the analog output area.

Access to analog values of an AS-i line via data records

Address of AS-i slave	Start addresses for analog values in data record 25 or 26
1	2
2	10
3	18
4	26
5	34
6	42
7	50
8	58
9	66
10	74
11	82
12	90
13	98
14	106
15	114
16	122
17	130
18	138
19	146
20	154
21	162
22	170
23	178
24	186
25	194
26	202
27	210
28	218
29	226
30	234
31	242

Examples for accesses:

Analog channel 1 is accessed by Slave 7 with an offset of 50.

Analog channel 1 is accessed by Slave 30B with an offset of 238.

7.2.2.13 Write AS-i line analog output data (Write_AODI)

Meaning

This call writes the process image of the analog output data of the AS-i line of an AS-i master.

Structure of the utility WRREC – Index 26

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Slave 1, Channel 1 or Slave 1A, Channel 1							
3								
4	Slave 1, Channel 2 or Slave 1A, Channel 2							
5								
6	Slave 1, Channel 3 or Slave 1B, Channel 1							
7								
8	Slave 1, Channel 4 or Slave 1B, Channel 2							
9								
...	...							
...								
242	Slave 31, Channel 1 or Slave 31A, Channel 1							
243								
244	Slave 31, Channel 2 or Slave 31A, Channel 2							
245								
246	Slave 31, Channel 3 or Slave 31B, Channel 1							
247								
248	Slave 31, Channel 4 or Slave 31B, Channel 2							
249								

You can use analog value access to the complete AS-i line to save I/O address space in the S7 station.

Note

For mapping the analog values in the data record, see section "Read AS-i line analog input data (Read_AIDI) (Page 78)".

Note**Write access to analog data**

Write accessing of the analog data of an AS-i slave cannot be performed if the slave was configured using STEP 7.

7.2.3 AS-i slave calls**7.2.3.1 Configure parameter value (Set_Permanent_Parameter)****Meaning**

This call configures a parameter value for the specified AS-i slave in the AS-i master CM 1243-2. The value is saved in non-volatile memory of the AS-i master CM 1243-2.

The configured parameter is not transferred to the AS-i slave immediately by the AS-i master CM 1243-2.

After the call, the AS-i master CM 1243-2 switches to offline mode and switches back to normal mode again (restart of the AS-i master).

For some AS-i slave profiles (Combined Transaction Type), the AS-i master CM 1243-2 itself administers the AS-i slave parameterization. In these cases, the parameters in the call are ignored.

Structure of the utility WRREC – Index 3

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameters			
					P3	P2	P1	P0
3	Reserved 0x00							

7.2.3.2 Read configured parameter value (Get_Permanent_Parameter)

Meaning

With this call, the slave-specific parameters stored in the AS-i master CM 1243-2 are read.
 The job cannot be used for all slaves of the Combined Transaction Type.

Structure of the utility RDREC – Index 4

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameters			
					P3	P2	P1	P0
3	Reserved 0x00							

7.2.3.3 Write parameter value (Write_Parameter)

Meaning

The parameters transferred in the call are forwarded to the addressed AS-i slave. The parameters are stored in non-volatile memory on the AS-i master CM 1243-2.

The AS-i slave transfers its current status as a parameter echo in the response. The response can deviate from the value just written.

Exceptions

There are a few AS-i slave types for which the AS-i master administers the slave parameterization itself. The configured parameters for these AS-i slaves are always equal to F_H. For these slaves, the AS-i master itself administers the AS-i slave parameterization.

Structure of the utility WRREC – Index 5

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameters			
					P3	P2	P1	P0
3	Reserved 0x00							

7.2.3.4 Read parameter value (Read_Parameter)

Meaning

This call reads the current parameter of an AS-i slave from the AS-i master CM 1243-2.

This value must not be confused with the parameter echo in section "Read parameter echo (Get_Write_Parameter_Echo) (Page 96)", which the AS-i slave supplies as a response to the job "Write parameter value".

Structure of the utility RDREC – Index 6

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameters			
					P3	P2	P1	P0
3	Reserved 0x00							

7.2.3.5 Configure configuration data (Set_Permanent_Configuration)

Meaning

With this call, the following configuration data are configured for the addressed AS-i slave.

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

The configuration data is saved in non-volatile memory of the AS-i master CM 1243-2. The AS-i master uses the configuration data as the planned data for protected mode. This call is not executed in protected mode.

The configuration data are defined by the manufacturer of the AS-i slave. The meaning of the configuration data is described in the AS-i master specification "AS-Interface Complete Specification". If the addressed AS-i slave does not support extended ID code 1 / 2, the value F_H must be specified for this in the call.

When this call is executed, the AS-i master switches to the offline phase and switches back to normal mode again (restart of the AS-i line).

The call can only be executed in configuration mode.

Note**Non-executable function for previously loaded AS-i slave configuration**

The function cannot be performed when an AS-i slave configuration has already been loaded from STEP 7 into the AS-i master CM 1243-2.

Structure of the utility WRREC – Index 8

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	I/O configuration				ID code			
3	ID1 code				ID2 code			

7.2.3.6 Read configuration data (Get_Permanent_Configuration)**Meaning**

With this call, the following configuration data (configured planned data: PCD) of an addressed AS-i slave are read:

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

This data is read from the EEPROM of the AS-i master.

The configuration data are defined by the manufacturer of the AS-i slave. The meaning of the configuration data is described in the AS-i master specification "AS-Interface Complete Specification".

Structure of the utility RDREC – Index 9

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	I/O configuration				ID code			
3	ID1 code				ID2 code			

7.2.3.7 Read actual configuration data (Read_Actual_Configuration)

Meaning

The following configuration data (CDI) of an addressed AS-i slave determined by the AS-i master on the AS-Interface is read with this call:

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

The configuration data are defined by the manufacturer of the AS-i slave. The meaning of the configuration data is described in the AS-i master specification "AS-Interface Complete Specification".

Structure of the utility RDREC – Index 11

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	I/O configuration				ID code			
3	ID1 code				ID2 code			

7.2.3.8 Read AS-i slave parameter string (Read_Parameter_String)

Meaning

For AS-i slaves with the profile 7.4, this call can be used to read a parameter string from the AS-i slave with the specified AS-i slave address.

The AS-i master supplies up to 220 bytes of reply data. The AS-i master signals the actual number of parameter bytes sent by the AS-i slave in Byte 2. The maximum number of parameter bytes is 220.

If the AS-i slave sends a string longer than 220 bytes, the AS-i master aborts string transfer and terminates the job with an error. The received data is not made available to the user program.

While transmission of the string is running, there is no transfer of user data / analog data with the addressed AS-i slave.

Structure of the utility RDREC – Index 27

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (possibly irrelevant)							
222	String byte 220 (possibly irrelevant)							

7.2.3.9 Write AS-i slave parameter string (Write_Parameter_String)

Meaning

For AS-i slaves with the profile 7.4, this call can be used to send a parameter string to the AS-i master, which forwards it to the specified AS-i slave address.

A parameter string of up to 220 bytes is transferred with the call. The AS-i master calculates the actual number of parameter bytes to be sent to the AS-i slave from byte 2. The maximum number of parameter bytes is 220.

The other information in the string is not evaluated by the AS-i master and is forwarded transparently to the AS-i slave. While transmission of the string is running, there is no transfer of user data / analog data with the addressed AS-i slave.

Structure of the utility WRREC – Index 28

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (possibly irrelevant)							
222	String byte 220 (possibly irrelevant)							

7.2.3.10 Read AS-i slave diagnostics string (Read_Diagnostic_String)

Meaning

For AS-i slaves with the profile 7.4, this call can be used to read a diagnostic string from the AS-i slave with the specified AS-i slave address. The AS-i master supplies up to 220 bytes of reply data. The AS-i master signals the actual number of diagnostic bytes sent by the AS-i slave in Byte 2 (number of diagnostic bytes).

If the AS-i slave sends a string longer than 220 bytes, the AS-i master aborts string transfer and terminates the call with an error. The received data is not made available to the user program.

While transmission of the string is running, there is no transfer of user data / analog data with the addressed AS-i slave.

Structure of the utility RDREC – Index 29

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (possibly irrelevant)							
222	String byte 220 (possibly irrelevant)							

7.2.3.11 Read AS-i slave ID string (Read_Identification_String)

Meaning

For AS-i slaves with the profile 7.4, this call can be used to read an identification string from the AS-i slave with the specified AS-i slave address.

The AS-i master supplies up to 220 bytes of reply data. The AS-i master signals the actual number of ID bytes sent by the AS-i slave in Byte 2 (number of ID bytes).

If the AS-i slave sends a string longer than 220 bytes, the AS-i master aborts string transfer and terminates the call with an error. The received data is not made available to the user program.

While transmission of the string is running, there is no transfer of user data / analog data with the addressed AS-i slave.

Note

For this call, bytes which contain the bits "Follows" and "Valid" are also transferred (see AS-i slave profile of the Combined Transaction Types).

Structure of the utility RDREC – Index 30

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (possibly irrelevant)							
222	String byte 220 (possibly irrelevant)							

7.2.3.12 Write CTT2 request (Write_CTT2_String)

Meaning

This call is used to send a CTT2 request according to the AS-i slave profile "CombinedTransationType2" to the AS-i master with a byte string. The master forwards the string bytes to the AS-i slave address specified in the send buffer.

A string with up to 220 bytes is transferred to the AS-i master with this call. The AS-i master calculates the actual number of string bytes to be sent to the AS-i slave from byte 2 of the send buffer (number of string bytes). The number of string bytes is specified by the user program.

The addressed AS-i slave responds to the CTT2 request with a CTT2 response. This response can be fetched using the call "Read CTT2 request".

The structure of the CTT2 request or CTT2 response (code, index, etc.) begins with string byte 1. You will find further information about this in the respective AS-i slave description.

While the string transfers are executed on AS-i, cyclic user data/analog data transfer does not take place with the addressed AS-i slave (this does not apply to digital I/O bits).

The type of protocol used means that transfer of up to 200 bytes can take up to half a minute.

Structure of the utility WRREC – Index 31

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (possibly irrelevant)							
222	String byte 220 (possibly irrelevant)							

7.2.3.13 Read CTT2 request (Read_CTT2_String)

Meaning

This call is used to read an acyclic CTT2 request from an AS-i slave according to the AS-i slave profile "CombinedTransationType2".

The request that was written with the call "Write CTT2 request" (Index 31) is answered by the slave. This response can be read using the call "Read CTT2 request (Index 31)". The AS-i master transfers up to 223 bytes in the response, of which up to 220 are string bytes.

The actual number of string bytes contains Byte 2.

Only the most recent CTT2 response is read back in each case. If several "Write_CTT2-String" calls are issued in succession, previous responses will be lost.

The structure of the CTT2 request or CTT2 response (code, index, etc.) begins with string byte 1. You will find further information about this in the respective AS-i slave description.

While transmission of the string is executed on AS-i, there is no transfer of cyclic analog data with the addressed AS-i slave. The type of protocol used means that transfer of up to 200 bytes can take up to half a minute.

Structure of the utility RDREC – Index 31

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Number of string bytes							
3	String byte 1							
4	String byte 2							
...	...							
221	String byte 219 (possibly irrelevant)							
222	String byte 220 (possibly irrelevant)							

7.2.3.14 Read AS-i slave I/O (Read_I/O_Configuration)

Meaning

The I/O configuration of an AS-i slave can be read out directly over the AS-i cable with this call. The call is intended for diagnostics purposes and is not required in normal master mode.

Structure of the utility RDREC – Index 33

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				I/O configuration			
3	Reserved 0x00							

7.2.3.15 Read AS-i slave ID (Read_ID-Code)

Meaning

The ID code of an AS-i slave can be read out directly over the AS-i cable with this call. The call is intended for diagnostics purposes and is not required in normal master mode.

Structure of the utility RDREC – Index 34

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				ID code			
3	Reserved 0x00							

7.2.3.16 Read AS-i slave extended ID1 (Read_Extended_ID-Code_1)

Meaning

The extended ID1 code of an AS-i slave can be read out directly over the AS-i cable with this call. The call is intended for diagnostics purposes and is not required in normal master mode.

Structure of the utility RDREC – Index 24

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				ID1 code			
3	Reserved 0x00							

7.2.3.17 Read AS-i slave extended ID2 (Read_Extended_ID-Code_2)

Meaning

The extended ID2 code of an AS-i slave can be read out directly over the AS-i cable with this call. The call is intended for diagnostics purposes and is not required in normal master mode.

Structure of the utility RDREC – Index 35

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				ID2 code			
3	Reserved 0x00							

7.2.3.18 Read AS-i slave status (Read_Status)

Meaning

The status register of the addressed AS-i slave can be read out with this call. The flags of the status register have the following meaning depending on the type of the AS-i slave:

Status bit	AS-i slave according to standard 2.0	AS-i slave according to standard 2.1, V3
S0	Address volatile This flag is set if <ul style="list-style-type: none"> the AS-i slave-internal routine for permanent storage of the AS-i slave address is running. This can last up to 15 ms and must not be interrupted by another addressing call. the AS-i slave-internal address comparison determines that the permanently saved address is not identical to the entry in the address register. 	Address/ID code volatile
S1	Parity error detected This flag is set if the AS-i slave has detected a parity error in a receive message frame since the last "Read and delete status" call.	I/O error detected An AS-i slave can set this flag if it detects a fault (e.g. wire break) on the connected I/O.
S2	End bit error detected This flag is set if the AS-i slave has detected an end bit error in a message frame since the last "Read and delete status" call.	Reserved
S3	Read error in non-volatile memory This bit is set if the AS-i slave has discovered a read error when reading the non-volatile memory.	

Structure of the utility RDREC – Index 80

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				AS-i slave status			
					S3	S2	S1	S0
3	Reserved 0x00							

7.2.3.19 Read parameter echo (Get_Write_Parameter_Echo)

Meaning

With the call "Get_Write_Parameter_Echo", the echo values for an AS-i slave are output as a response to a "Write_Parameter" call (section "Write parameter value (Write_Parameter) (Page 83)").

The echo value of an AS-i slave originates in the last parameter call sent to this AS-i slave. If several "Get_Write_Parameter_Echo" calls are issued, previous echo values are lost.

Structure of the utility RDREC – Index 81

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	0x0				Parameters			
					S3	S2	S1	S0
3	Reserved 0x00							

7.2.3.20 Write AS-i slave analog output data (Write_Analog_Output_Data)

Meaning

This call writes the analog output data of an AS-i slave.

Note

Write access to analog data

Write accessing of the analog data of an AS-i slave cannot be performed when the slave was configured using STEP 7.

Structure of the utility WRREC – Index 82

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Channel 1 of the analog slave							
3								
4	Channel 2 of the analog slave							
5								
6	Channel 3 of the analog slave							
7								
8	Channel 4 of the analog slave							
9								
10	Reserved 0x0000							
11								

7.2.3.21 Read AS-i slave analog input data (Read_Analog_Input_Data)

Meaning

This call reads the analog input data of an AS-i slave.

Structure of the utility RDREC – Index 83

Byte	Meaning							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Version_hi = 0x00							
1	Version_lo = 0x00							
2	Channel 1 of the analog slave							
3								
4	Channel 2 of the analog slave							
5								
6	Channel 3 of the analog slave							
7								
8	Channel 4 of the analog slave							
9								
10	Reserved 0x0000							
11								

Diagnostics

8.1 Overview

Diagnostics options

The following diagnostics options are available for the AS-i master CM 1243-2:

- LEDs on the module
- Diagnostics in STEP 7 (online presentation of the network and device view, diagnostics buffer)
- Alarm messages in user program
- Creation of user-specific web pages via the web server of the S7-1200

You will find further information on the LED displays in sections "LEDs of the AS-i master CM 1243-2 (Page 18)" and "LEDs of the AS-i data decoupling unit DCM 1271 (Page 24)".

The diagnostic possibilities in STEP 7 and in the user program are described in the following sections.

8.2 Diagnostics in STEP 7

Diagnostics in STEP 7

For diagnosing the AS-i master and the AS-i slave, STEP 7 must be switched to "Online" status first. Use the STEP 7 function "Connect online" for this purpose.

If you have configured AS-i slaves in STEP 7, the diagnostic information about slaves can also be displayed in STEP 7.

After the connection has been established, the status information of the AS-i slaves will be displayed in the network view. The information of the AS-i master is displayed symbolically in the device view. The status of these devices will also be displayed to the right of the device in the project navigation by means of a symbol. For an explanation of the different status symbols, please refer to the relevant tool tip.

STEP 7 offers several possibilities for requesting the diagnostic information of the AS-i master:

- In the network view of the device configuration, special diagnostic symbols indicate the status of the AS-i master and the AS-i slave. Red symbols indicate an error, green symbols indicate the "good" status for the devices.
- The same information is also indicated in the STEP 7 project tree. This provides a quick overview of system status, because error information is transferred to the higher-level components in accordance with the hierarchy. "Error in subordinate component" will therefore be indicated by the status symbol for the S7-1200 CPU when one or more AS-i slaves report an error.
- When an AS-i master is selected, you can open the "Online & Diagnostics" view. You can start this from the menu "Online -> Online & Diagnostics". You can call up information here concerning the status of the AS-i master.
- The control panel of the AS-i master can also be called up in this display. This shows the status of the LEDs.
- All the relevant events are stored in the diagnostic buffer of the S7-1200 CPU. You can display the diagnostic buffer in the "Online & Diagnostics" window for a selected S7-1200 CPU.

Note

Diagnostics by means of the integrated LEDs

The AS-i data decoupling unit DCM 1271 is not configured in STEP 7, so no diagnostic information can be called up there for this unit.

The AS-i data decoupling unit DCM 1271 can be diagnosed by means of the integrated LEDs.

Signaling of a ground fault can also be transferred to a digital input of the S7-1200 via the terminal described in section Displays and connections of the AS-i data decoupling unit DCM 1271 (Page 23). The status can then be evaluated there in the user program.

8.3 Alarms

Alarms

The AS-i master CM 1243-2 sends a diagnostic interrupt request to the CPU in the following situations:

- The AS-i master CM 1243-2 has detected a problem - for example, failure of a slave (incoming event).
- The problem was rectified or no longer exists (outgoing event).

If OB 82 does not exist, this error is written in the diagnostics buffer. The CPU will not take any action and does not switch to STOP.

If an OB 82 exists, the operating system responds to an incoming event by calling the OB 82. The S7 CPU then interrupts the cyclic user program and enters the event in the system diagnostics buffer as a "Module fault" message.

Some diagnostic information is provided in the local data of the OB 82 for the user (e.g. Which module triggered the interrupt? What type of error has occurred?).

Following execution of the OB 82, the S7 CPU continues the cyclic program from the point of interruption.

The events are listed below that trigger a diagnostic interrupt in the AS-i master CM 1243-2:

- AS-i master signals a configuration error (CER) in protected mode
- AS-i master detects a problem with the AS-i supply voltage (APF)
- One or more slaves signal an I/O fault (PF) to the AS-i master
- An error occurred on parameterizing an AS-i slave using CTT2 protocol

Slave-specific diagnostic interrupts (e.g. configuration errors) are signaled using the hardware ID (HW ID) of the respective slave. You can read the hardware ID for a selected AS-i slave from the inspector window in STEP 7:

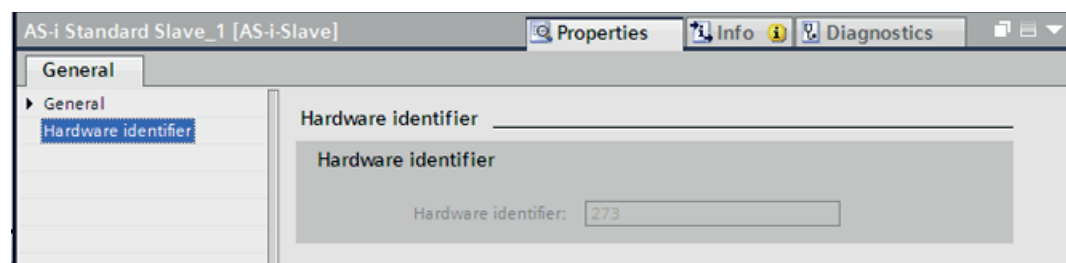


Figure 8-1 Inspector window in STEP 7

If you have not configured any slaves in STEP 7, you will find the hardware IDs for the slaves in the address overview of the inspector window:

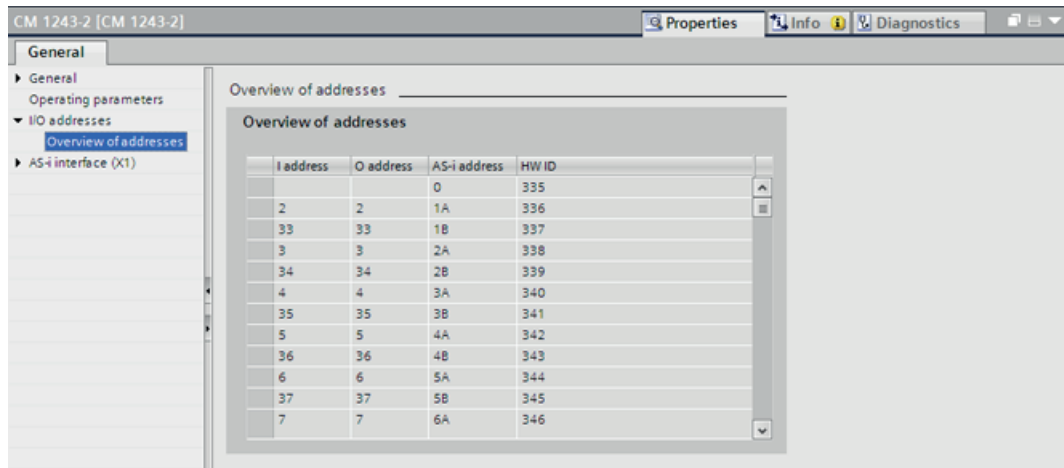


Figure 8-2 Address overview of the inspector window

Line-specific diagnostic interrupts (e.g. AS-i POWER FAIL) are signaled using the hardware ID (HW ID) of the AS-i interface. You will find this HW ID in the properties of the AS-i master:

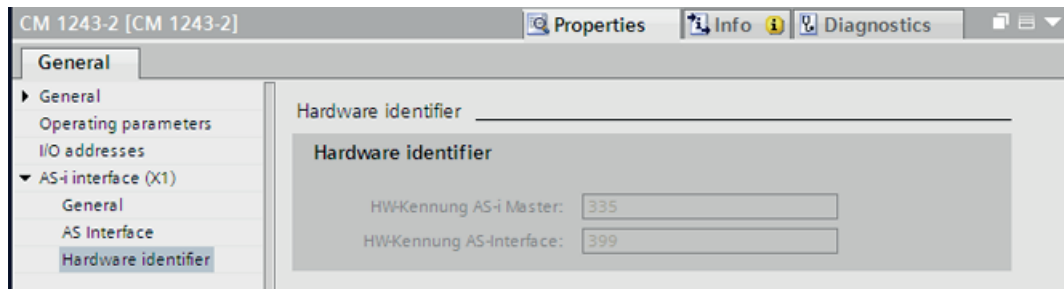


Figure 8-3 Hardware ID in the properties of the AS-i master CM 1243-2

8.3.1 Possible response to the diagnostic interrupt

Possible response to the diagnostic interrupt

Diagnostic events of the AS-i master and all AS-i slaves are signaled by means of OB 82 (e.g. no voltage on AS-Interface, I/O error).

Note**Diagnostic buffer**

Please note that OB 82 is only called for the first error event. If an error from an AS-i slave is already active, subsequent AS-i slave errors will only be indicated in the diagnostics buffer of the CPU.

Diagnostic data records can be read out during program execution of the OB 82 block to determine the cause of the interrupt.

See Section Diagnostic data records (Page 104) for an overview of these possibilities.

8.3.2 Interrupt response in different CM operating states

Interrupt response in different CM operating states

The AS-i master CM 1243-2 generates diagnostic interrupts that are triggered by external alarm events, in protected mode only and not in configuration mode.

If the diagnostic interrupt cannot be activated (e.g. : when the S7-1200 is in STOP), the event will only be indicated in the diagnostics buffer and via the LEDs of the AS-i master CM 1243-2 and the S7-1200 CPU.

8.4 Diagnostic data records

Further diagnostics information can be read out from the AS-i master CM 1243-2 using the data record interface.

The table below provides an overview of the data records that can be used for this purpose:

Table 8- 1 Diagnostic data blocks

Name	Index	Information
Read lists and flags (Get_LPS_LAS_LDS_LPF_Flags)	84	List of configured AS-i slaves List of active AS-i slaves List of detected AS-i slaves List of existing I/O faults AS-i master flags (e.g. APF)
Read AS-i slave status (Read_Status)	80	AS-i slave status register Also contains information about I/O faults
Read AS-i slave diagnostics string (Read_Diagnostic_String)	29	Diagnostics string of an AS-i slave acc. to profile 7.4
Get_LAS_CDI_PI_Flags	85	Configuration data for the connected slaves

To access these data records, call the block "RDREC" in your program. Instructions for using this block and the parameters required can be found in the section describing the data record interface (section "Using the data record interface (Page 55)").

8.5 Diagnostics via the S7-1200 Web server

Diagnostics via the S7-1200 Web server

The Web server of the S7-1200 enables you to access data from Web pages regarding your CPU and the connected components.

The Web server also enables user-defined Web pages to be integrated which display contents of the CPU as well as the AS-i master CM 1243-2.

The diagnostic data of the AS-i master CM 1243-2 can also be read via the user program interface (alarms, diagnostic data records) and integrated into the Web pages.

Any HTML authoring software can be used to create the Web pages – you can construct and arrange the pages as you wish.

The connection between the Web page contents and the data of the user program is established using "AWP commands" (Automation Web Pages) which you insert in your HTML code.

A detailed description of these possibilities can be found in the system manual for S7-1200 in the section "Web server".

Troubleshooting / fault displays

9.1 Replacing a defective AS-i slave / automatic address programming

Easy replacement of AS-i slaves

The "Automatic address programming" function makes it particularly easy for you to replace defective AS-i slaves.

Note

It is important to note that "Automatic address programming" is only possible when the AS-i master CM 1243-2 is in protected mode and only one AS-i slave of a particular type has failed.

It is explained below how you can replace failed AS-i slaves easily using the "Automatic address programming" function.

Recognizing a defective AS-i slave

In the case of a slave failure, the CER LED on the AS-i master CM 1243-2 is lit.

The front display of each AS-i slave has an LED, which signals the failure of the slave.

Replacing a defective AS-i slave

Replace the defective AS-i slave with an **identical** AS-i slave with address zero (setting in delivery state).

For this slave, the AS-i master CM 1243-2 then programs the address of the original node which has been replaced.

If no further faults are active, the AS-i LED returns to the color green.

9.2 Fault indications/fault remedies

Fault indications/remedies for faults on the AS-i master CM 1243-2

Below is a list of possible fault indications and potential remedial measures when operating the AS-i master CM 1243-2.

Fault	Possible cause	Remedy
AS-i LED flashes red	The current consumption of the AS-i slaves is too high. Result: Voltage on the AS-i cable is too low.	Check the current consumption of the AS-i slaves. Supply the AS-i slaves with external auxiliary voltage, if applicable.
	No voltage on the AS-i cable or voltage too low.	Check the connection with the AS-i power supply unit.
	Short-circuit on the AS-i cable	Check the AS-i cable and the connected AS-i slaves.
DIAG LED not lit	There is no supply over the communications bus.	Check whether the module is inserted correctly.
DIAG LED flashes green, but does not switch to constant green light	The AS-i master CM 1243-2 is not configured.	Configure the AS-i master CM 1243-2 in STEP 7.
DIAG LED flashes red	Possible causes: <ul style="list-style-type: none"> • AS-i supply voltage missing • Configuration fault (i.e. incorrect or missing slave) • Parameterization error • Peripheral fault 	<ul style="list-style-type: none"> • If the AS-i LED is lit in red at the same time: Check the AS-i supply voltage • Check the slave configuration (check connected slaves or change slave configuration - see Section Configuring AS-i slaves (Page 40) and/or Addressing an AS-i slave (Page 46)). • If the PF LED is lit at the same time: Check the connected I/O.
CER LED is constantly lit.	A configured AS-i slave has failed (evaluate slave indications).	Replace the defective AS-i slave or configure the AS-i master CM 1243-2 again if the AS-i slave is not required.
	An non-configured AS-i slave was connected to the AS-i line.	Remove the AS-i slave or configure the AS-i master CM 1243-2 again.
	An AS-i slave has been connected whose configuration data (I/O configuration, ID codes) does not match the values of the configured AS-i slaves.	Check whether an incorrect AS-i slave has been connected. Configure the AS-i master CM 1243-2 again if necessary.
CER display flickers, i.e. a configured AS-i slave fails sporadically.	Loose connection	Check the connections of the AS-i slaves.
	Injection of interference on the AS-i cable.	Check that the grounding of the AS-i master CM 1243-2 and routing of the AS-i cable are correct. Check whether the shield of the AS-i power supply unit is connected correctly.

Fault	Possible cause	Remedy
The AS-i master CM 1243-2 does not switch from configuration mode to protected mode.	An AS-i slave with address 0 is connected to the AS-i cable. The AS-i master CM 1243-2 cannot switch to protected mode when this slave is connected.	Remove the AS-i slave with the address 0.
In STEP 7 it is not possible to switch between configuration mode and protected mode	The automation system is in "RUN" mode.	Switch the automation system to "STOP".
The AS-i master CM 1243-2 does not switch from protected mode to configuration mode.	The automation system is in "RUN" mode.	Switch the automation system to "STOP".
Automatic address programming does not take place.	The configuration data (I/O configuration, ID code) of the replaced AS-i slave does not match the values of the original slave.	Check that the correct replacement slave was used. Compare the manufacturer's information with regard to configuration data. If the original slave should be replaced by a different type, assign the address with the address programmer and configure the AS-i master CM 1243-2 again.
	Replaced AS-i slave does not have the address 0.	Set the address of the replaced slave using the address programmer.
	Replaced AS-i slave is not correctly connected or is defective.	Check the connections of the slave; replace the slave if necessary.
	The AS-i master CM 1243-2 is in configuration mode.	Program the address of the new AS-i slave with the address programming device or via the command interface of the AS-i master CM 1243-2.
LED "CER" and the LEDs of active AS-i slaves flicker sporadically.	An extender in AS-Interface has been installed with the connections to "Line1" and "Line2" interchanged.	Correct the connections on the extender.
PF LED is lit	One or more AS-i slaves signal a fault in the connected I/O.	Check the I/O components connected to the AS-i slaves and the cabling for wire break or short-circuit.

Reference

You will find further information about the LEDs on the AS-i master CM 1243-2 in section "LEDs of the AS-i master CM 1243-2 (Page 18)".

Fault indications/fault remedies for the data decoupling unit DCM 1271

Below is a list of possible fault indications and potential remedial measures when operating the AS-i data decoupling unit DCM 1271.

Fault	Possible cause	Remedy
DIAG LED is off	The supply voltage is not present or its polarity is reversed.	Check that the supply voltage is connected correctly on the top of the AS-i data decoupling unit DCM 1271
ASI OL LED flashes	Overloading of the AS-i cable has occurred, or the AS-i cable is short-circuited.	Check the current consumption of the AS-i cable. Rectify the short-circuit, if applicable - if there is no short-circuit and the current consumption is greater than 4 A, you must reduce the number of slaves.
EFD LED flashing	A ground fault has been detected for ASI+ or ASI-.	Check which of the two cores of the AS-i cable is connected to ground and rectify the ground fault.

Reference

For additional information on the LEDs on the data decoupling unit DCM 1271, see section "Displays and connections of the AS-i data decoupling unit DCM 1271 (Page 23)".

Technical data

Technical data for the AS-i master CM 1243-2

		3RK7243-2AA30-0XB0
Protection class IP		IP20
Insulation voltage rated value	V	500
Ambient temperature if installed on vertical mounting rail		
• during operation	°C	0 ... 45
Ambient temperature if installed on horizontal mounting rail		
• during operation	°C	0 ... 55
Ambient temperature		
• during storage	°C	-40 ... +70
Ambient temperature		
• during transport	°C	-40 ... +70
Relative humidity at 25 °C during operating maximum	%	95
Installation altitude at a height over sea level maximum	m	2 000
Explosion protection category for gas		none
Explosion protection category for dust		none
Explosion protection labeling for intrinsic safety of related operating resources		
• EEX ia		No
• EEX ib		No
Number of AS-i slaves per AS-Interface maximum		62
Number of inputs for AS Interface maximum		496
Number of outputs for AS Interface maximum		496
Number of units per CPU maximum		1
Product component optical interface		No
Number of interfaces		
• as AS-interface		1
• according to Industrial Ethernet		0
• according to PROFINET		0
• according to RS 485		0
• according to USB		0
• according to wireless		0
• others		1

			3RK7243-2AA30-0XB0
Transfer rate of the AS-interface maximum	bit/s		167 000
Module format			S7-1200 design
Width	mm		30
Height	mm		100
Depth	mm		75
Type of mounting			snap-on fastening on 35 mm standard rail
Type of data transmission			S7-1200 backplane bus
Type of projection of the AS-interface			With STEP 7, command interface
Type of voltage supply			via backplane bus
Protocol is supported			
• ASIsafe(Safety at work) protocol			No
• PROFIBUS protocol			No
• PROFINET CBA protocol			No
• PROFINET IO protocol			No
• PROFI-safe protocol			No
• SNMP			No
• other bus systems			No
• TCP/IP			No
Standard for wireless communication IEEE 802.11			No
Bus cycle time of the AS-interface			
• at 31 slaves	s		0.005
• at 62 slaves	s		0.01
Consumed current from profile conductors of the AS-interface with external 24 V-supply voltage maximum	A		0.1
Current consumed from backplane bus maximum	A		0.25
Operating condition separate power supply 24 V			No
Resistive loss	W		2.9
AS-interface masterprofile is supported			M4 (in acc. with AS-interface specification V 3.0)
Version of the AS-interface specification			V 3.0
Design of the electrical connection of the AS-Interface			Screw-type connection
Type of display as status display by LED			AS-i, PF, CM, CER, DIAG
Acceptability for application safety-related function			No
Product feature redundancy capability			No

	3RK7243-2AA30-0XB0
Product function	
• diagnosis via E-mail	No
• adapted for AS-i Power24V comment	All product versions
• adapted for AS-i Power24V	Yes
• galvanic isolation	Yes
• web-based management	No
Access to analog I/O data	via process diagram/peripheral addresses and data record transfer
Access to digital I/O data	via process diagram/peripheral addresses and data record transfer

10.1 AS-i cycle time

Dependency of AS-i cycle time on the number of connected slaves

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

$$t_{\text{cycl}} = (1 + \text{Number of activated AS-i slaves}) \times 154 \mu\text{s}$$

Note

If two AS-i slaves with an extended address area occupy the same address (e.g. address 5A and address 5B), this slave pair will be calculated as one AS-i slave in the above formula. This is due to the fact that slave pairs with the same address are only addressed in alternate cycles. The cycle time in the above formula therefore doubles for such slaves.

Technical data of the data decoupling unit DCM 1271

Bestell-Nr.	3RK7271-1AA30-0AA0
product designation	AS-Interface data decoupling unit
Number of outputs for AS Interface maximum	1
Number of electrical connections for alarm contact	3
Type of the connectable conductor cross-section	
• for AWG conductors for auxiliary contacts	3x (24 ... 16)
• for auxiliary contacts	
– solid	3x (0.2 ... 3.3 mm ²)
– finely stranded with conductor end processing	3x (0.2 ... 3.3 mm ²)
Type of display as status display by LED	EFD, ASI OL, DIAG

10.1 AS-i cycle time

Bestell-Nr.	3RK7271-1AA30-0AA0	
Design of the short-circuit protection	electronic	
Design of the electrical connection for auxiliary and control current circuit	screw-type terminals	
Operating current of the auxiliary contacts at DC-13 at 24 V	A	0.05
Output voltage		
• 1 for DC		
– rated value		
– maximum	V	31.6
– minimum	V	20.5
– rated value	V	30
• 2 for DC rated value	V	24
Output current for DC maximum	A	4
Type of voltage of the input voltage	DC	
Input voltage		
• 1 for DC		
– rated value		
– maximum	V	32
– minimum	V	21
– rated value	V	30
• 2 for DC rated value	V	24
Input current for DC maximum	A	4.1
Adjustable response current of the current-dependent overload release		
• initial value	A	4
• final value	A	4
Active power supplied	W	120
Characteristic feature of the output short-circuit protected	Yes	
Suitability for use safety-related circuits	No	

Bestell-Nr.	3RK7271-1AA30-0AA0	
Product function		
• removable terminal for auxiliary and control circuit		Yes
• AS-interface data decoupling		Yes
• self-reset		Yes
• short-circuit to earth recognition		Yes
• adapted for AS-i Power24V		Yes
• adapted for grounded AS-i networks		Yes
• adapted for non-grounded AS-i networks		Yes
• manual RESET		No
• reset external		No
• sequential connected time-delay		No
• test function of signaling contacts		No
Protocol is supported AS interface protocol		Yes
Item designation		
• according to DIN 40719 extendable after IEC 204-2 according to IEC 750		A
• according to DIN EN 61346-2		A
Relative humidity at 25 °C during operating maximum	%	95
Reset function		No
Protection class IP		IP20
mounting position		vertical, horizontal
Type of mounting		35-mm DIN rail mounting or wall mounting with plug-in flaps
Width	mm	30
Height	mm	100
Depth	mm	75
Installation altitude at a height over sea level maximum	m	2 000
Ambient temperature		
• during operating	°C	0 ... 55
• during storage	°C	-40 ... +70
Verification of suitability	CE / cULus / FM / ATEX	

AS-Interface Protocol Implementation Conformance Statements



A.1 AS-Interface Protocol Implementation Conformance Statement (PICS)

PICS for the AS-i master CM 1243-2

Vendor	SIEMENS AG
Product name	AS-i master CM 1243-2
Order number	3RK7 243-2AA30-0XB0
Firmware version	V1.0
Master profile	M4
Date	01.12.2011

List of available master functions

Character	Meaning
X	Function available
-	Function not available

No.	Function or call to the host interface (symbolic representation)	M4	Remark / implementation of the function with
1	Image, Status = Read_IDI()	X	Through automation system access to the I/O data of the AS-i master CM 1243-2
2	Status = Write_ODI(Image)	X	Through automation system access to the I/O data of the AS-i master CM 1243-2
3	Status = Set_Permanent_Parameter (Addr, Param)	X	See section "Description of the AS-i line calls and AS-i slave calls (Page 58)"
4	Param, Status = Get_Permanent_Parameter (Addr)	X	
5	Status, Param = Write_Parameter (Addr, Param)	X	
6	Status, Param = Read_Parameter(Addr)	X	
7	Status = Store_Actual_Parameters()	X	
8	Status = Set_Permanent_Configuration (Addr, Config)	X	
9	Status, Config = Get_Permanent_Configuration (Addr)	X	
10	Status = Store_Actual_Configuration()	X	By pressing the button "ACTUAL -> PLANNED" in the control panel of STEP 7.

A.1 AS-Interface Protocol Implementation Conformance Statement (PICS)

No.	Function or call to the host interface (symbolic representation)	M4	Remark / implementation of the function with	
11	Status, Config = Read_Actual_Configuration (Addr)	X	See Section "Description of the AS-i line calls and AS-i slave calls (Page 58)". Access to data record 84.	
12	Status = Set_LPS(List31)	X		
13	Status, List31 = Get_LPS()	X		
14	Status, List31 = Get_LAS()	X		
15	Status, List32 = Get_LDS()	X		
16.0	Status = Get_Flags()	X		
16.1	Status, Flag = Get_Flag_Config_OK()	X		
16.2	Status, Flag = Get_Flag_LDS.0()	X		
16.3	Status, Flag = Get_Flag_Auto_Address_Assign()	X		
16.4	Status, Flag = Get_Flag_Auto_Prog_Available()	X		
16.5	Status, Flag = Get_Flag_Configuration_Active()	X		
16.6	Status, Flag = Get_Flag_Normal_Operation_Active()	X		
16.7	Status, Flag = Get_Flag_APF()	X		CP error bit, LED indication (see section "Description of the AS-i line calls and AS-i slave calls (Page 58)") Access to data record 84.
16.8	Status, Flag = Get_Flag_Offline_Ready()	X		See Section "Description of the AS-i line calls and AS-i slave calls (Page 58)". Access to data record 84.
16.9	Status, Flag = Get_Flag_Periphery_OK()	X		
17	Status = Set_Operation_Mode(Mode)	X		By pressing the button "Configuration mode" or "Protected mode" in the control panel of STEP 7.
18	Status = Set_Offline_Mode(Mode)	X	See section "Description of the AS-i line calls and AS-i slave calls (Page 58)"	
19	Status = Activate_Data_Exchange(Mode)	-	Optional command; not implemented	
20	Status = Change_Slave_Address (Addr1, Addr2)	X	See Section "Description of the AS-i line calls and AS-i slave calls (Page 58)".	
21.1	Status = Set_Auto_Address_Enable	X		
21.2	Status = Get_Auto_Address_Enable	X		
22.1	Status, Resp = Cmd_Reset_ASI_Slave (Addr, RESET)	-		
22.2	Status, Resp = Cmd_Read_IO_Configuration (Addr, CONF)	X	See section "Description of the AS-i line calls and AS-i slave calls (Page 58)".	
22.3	Status, Resp = Cmd_Read_Identification_Code(Addr, IDCOD)	X		
22.4	Status, Resp = Cmd_Read_Status (Addr, STAT)	X		
22.5	Status, Resp = Cmd_Read_Reset_Status (Addr, STATRES)	-		Not relevant for AS-i master acc. to profile M4; not implemented
22.6	Status, Resp = Cmd_Read_Ext_ID-Code_1(Addr, IDCOD1)	X	See section "Description of the AS-i line calls and AS-i slave calls (Page 58)"	
22.7	Status, Resp = Cmd_Read_Ext_ID-Code_2(Addr, IDCOD2)	X		Not implemented
23	Status, S_List = Get_LPF()	X	See Section "Description of the AS-i line calls and AS-i slave calls (Page 58)". Access to data record 84.	

No.	Function or call to the host interface (symbolic representation)	M4	Remark / implementation of the function with
24	Status = Write_Extended_ID-Code_11(S_Ext_ID-Code_1)	X	See Section "Description of the AS-i line calls and AS-i slave calls (Page 58)". Not implemented
25	Almage, Status = Read_AIDI()	X	See section Description of the AS-i line calls and AS-i slave calls (Page 58) . Through automation system access to the I/O data of the AS-i master CM 1243-2
26	Status = Write_AODI(Almage)	X	
27	String, Status = Read_ParamStr(S_Addr)	X	See "Read_Parameter_String" in section Description of the AS-i line calls and AS-i slave calls (Page 58)
28	Status = Write_ParamStr(S_Addr, String)	X	See section Write AS-i slave parameter string (Write_Parameter_String) (Page 88)
29	String, Status = Read_DiagStr(S_Addr)	X	See section Read AS-i slave diagnostics string (Read_Diagnostic_String) (Page 89)
30	String, Status = Read_IdentStr(S_Addr)	X	See section Read AS-i slave ID string (Read_Identification_String) (Page 90)
B	Supported slave profiles		
1	Support of extended address mode	X	
2	Support of Combined transaction type 1 integrated (S-7.3 only)	X	
3	Full support of Combined transaction type 1 integrated	X	Support for profiles 7.3 and 7.4 only.
4	Support of Combined transaction type 2 integrated	X	
5	Support of Combined transaction type 3 integrated	X	
6	Support of Combined transaction type 4 integrated	X	
7	Support of Combined transaction type 5 integrated	X	

Dimension drawings

B.1 Dimension drawing AS-i master CM 1243-2

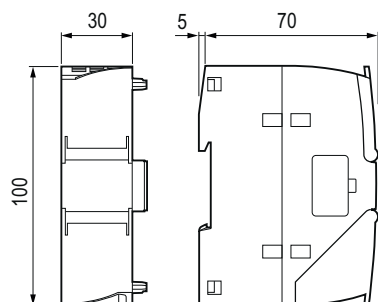


Figure B-1 Dimension drawing of AS-i master CM 1243-2

Note

All dimensions in the drawings are in millimeters.

B.2 Dimension drawing for AS-i data decoupling unit DCM 1271

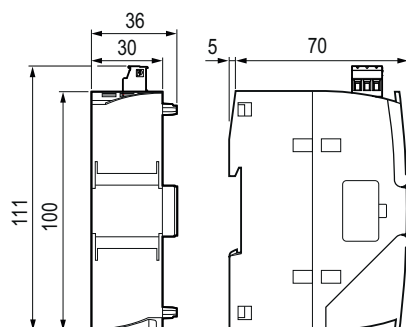


Figure B-2 Dimension drawing of the AS-i data decoupling unit DCM 1271

Note

All dimensions in the drawings are in millimeters.

Approvals

Overview of approvals and standards

The AS-i master CM 1243-2 and the AS-i data decoupling unit DCM 1271 have the following approvals and meet the following standards:

- cULus LISTED IND. CONT. EQ.
- FM
- ATEX: DEKRA 11ATEX0225X
- CE declaration of conformity
 - EU Directive 2004/108/EEC "Electromagnetic Compatibility" (EMC Directive)
 - EU Directive 2002/95/EC (RoHS)
- C-TICK
- Use in industrial environments according to:
 - EN 61000-6-4:2007
 - EN 61000-6-2:2005

Approvals issued

Note

Issued approvals on the type plate of the device

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

Standards and test specifications

The product meets the following standards and test specifications. The test criteria for the module are based on these standards and test specifications.

cULus approval



Underwriters Laboratories Inc. meets:

- Underwriters Laboratories, Inc.: UL 508 Listed (industrial control devices)
- Canadian Standards Association: CSA C22.2 Number 142 (process control equipment)

Note

The SIMATIC S7-1200 product series corresponds to the CSA standard.

The cULus mark indicates that the S7-1200 has been tested and approved by Underwriters Laboratories (UL) in accordance with the standards UL 508 and CSA 22.2 No. 142.

CE declaration of conformity



The product meets the requirements and safety objectives of the following EU directives and it complies with the harmonized European standards (EN) for programmable logic controllers which are published in the official documentation of the European Union.

- EU directive 2006/95/EEC "Electrical Equipment Designed for Use within Certain Voltage Limits" (Low Voltage Equipment Directive)
 - EN 61131-2:2007 Programmable controllers - Equipment requirements and tests
- EU Directive 2004/108/EEC "Electromagnetic Compatibility" (EMC Directive)
 - Emission
EN 61000-6-4:2007: Industrial area
 - Immunity
EN 61000-6-2:2005: Industrial area
- EU directive 94/9/EC "Equipment and protective systems intended for use in potentially explosive atmospheres" (ATEX Explosion Protection Directive)
 - EN 60079-15:2005: Type of protection 'n':

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens AG
Industry Automation
Industrial Communication SIMATIC NET
PO Box 2355
D90713 Nuremburg
Germany

You will find the CE Declaration of Conformity for this product on the Internet (<http://support.automation.siemens.com/WW/view/en/23126063/134200>).

FM certification



Factory Mutual Research (FM):
certification standard class number 3600 and 3611
Approved for use in:
Class I, Division 2, Gas Group A, B, C, D, Temperature Class T4A
Class I, Zone 2, IIC, Temperature Class T4, Ta = 55 °C

ATEX approval



EN 60079-0:2009: Potentially explosive atmosphere - general requirements
EN 60079-15:2010: Electrical apparatus for explosive gas atmospheres;
Type of protection 'n'
II 3 G Ex nA IIC T4 Gc

Over and above this, the following conditions must be met for the safe deployment of the product:

- Install the modules in a suitable enclosure with degree of protection of at least IP54 to EN 60529 and take into account the environmental conditions for operation of the devices.
- If the rated temperatures of 70 °C at the cable entry or 80 °C at the branching point of the wires are exceeded, the permitted temperature range of the selected cable must be suitable for the actual measured temperatures.
- Measures must be taken to prevent the rated voltage being exceeded by more than 40% due to transient disturbances.

C-Tick approval



The product meets the requirements of the AS/NZS 2064 standards (Class A)

Maritime approvals

The S7-1200 products are regularly submitted to the relevant authorities for approvals relating to specific markets and applications. If you require a list of the current approvals for individual devices, consult your Siemens contact.

Classification authorities:

- ABS (American Bureau of Shipping)
- BV (Bureau Veritas)
- DNV (Det Norske Veritas)
- GL (Germanischer Lloyd)
- LRS (Lloyds Register of Shipping)
- Class NK (Nippon Kaiji Kyokai)

Industrial environments

The product was developed for use in industrial environments.

Application	Requirements for emissions	Requirements for immunity
Industry	EN 61000-6-4:2007	EN 61000-6-2:2005

Electromagnetic compatibility (EMC)

The electromagnetic compatibility (EMC) of an electrical device is its capability of functioning as intended in an electromagnetic environment without emitting electromagnetic interference that could impair the operation of other electrical devices in the vicinity.

Electromagnetic compatibility - immunity	
EN 61000-4-2 Electrostatic discharge	8 kV air discharge to all surfaces 4 contact discharge to exposed conductive surfaces
EN 61000-4-3 Radiated electromagnetic field	80 to 1 000 MHz, 10 V/m, 80% AM at 1 kHz 1.4 to 2.0 GHz, 3 V/m, 80% AM at 1 kHz 2.0 to 2.7 GHz, 1 V/m, 80% AM at 1 kHz
EN 61000-4-4 Fast transient bursts	2 kV, 5 kHz with coupling network to AC and DC system power 1 kV, 5 kHz with coupling clamp to inputs/outputs
EN 61000-4-5 Surge immunity	DC systems - 2 kV common mode, 1 kV push-pull For DC systems (I/O signals, DC power supplies), external protection is necessary. 2 kV via coupling clamp on PROFIBUS cable
EN 61000-4-6 Conducted disturbances	150 kHz to 80 MHz, 10 V RMS, 80 % AM at 1 kHz
EN 61000-4-611 Voltage dips	DC systems 0% for 1 cycle, 40% for 12 cycles and 70% for 30 cycles at 60 Hz

Electromagnetic compatibility - emission	
Conducted interference EN 55022, Class A 0.15 MHz to 0.5 MHz 0.5 MHz to 5 MHz 5 MHz to 30 MHz	< 79 dB (µV) quasi peak; <66 dB (µV) mean value < 73 dB (µV) quasi peak; <60 dB (µV) mean value < 73 dB (µV) quasi peak; <60 dB (µV) mean value
Conducted emissions EN 55022, class A 30 MHz to 230 MHz 230 MHz to 1 GHz	< 40 dB (µV/m) quasi peak; measured at 10 m < 47 dB (µV/m) quasi peak; measured at a distance of 10 m

Environmental conditions

Environmental conditions - transportation and storage	
EN 60068-2-2, Test Bb, dry heat and EN 60068-2-1 Test Ab, cold	-40 °C to +70 °C
EN 60068-2-30, Test Db, damp heat	25 °C to 55 °C, 95% humidity
EN 60068-2-14, Test Na, temperature shock	-40 °C to +70 °C, dwell time 3 hours, 2 cycles
EN 60068-2-32 Free fall	0.3 m, five times, in product packaging
Atmospheric pressure	1 080 to 660 hPa (corresponding to an altitude of -1 000 to 3 500 m)

Environmental conditions - operation	
Ambient temperatures / air humidity (inlet air 25 mm below device)	0 °C to 55 °C horizontal mounting 0 °C to 45 °C vertical mounting 95% relative humidity, non-condensing
Atmospheric pressure	1080 to 795 hPa (corresponding to an altitude of -1000 to 2000 m)
Concentration of pollutants	SO ₂ : < 10 ppm (over 10 days) H ₂ S: < 1 ppm (over 10 days)
EN 60068-2-14, Test Nb, temperature change	5 °C to 55 °C, 3 °C/minute
EN 60068-2-27 Mechanical shock	15 g, 11 ms pulse, 3 positive and 3 negative shocks in each of the 3 axes (half sine)
EN 60068-2-6 Sinusoidal vibration (DIN rail mount)	2 mm PP from 2 to 13 Hz and 0.7 g from 13 to 100 Hz (according to shipbuilding 1); 10 sweeps per axis, 1 octave/minute

Protection class

- Protection class III according to EN 61131-2 (protective conductor not required)

Degree of protection

- Mechanical protection to EN 60529: IP20

Protects against finger contact with high voltage as tested by standard probe. External protection required for dust, dirt, water and foreign objects of < 12.5 mm in diameter.

List of references

The following further reading is recommended:

- AS-Interface. Das Aktuator-Sensor-Interface für die Automation
ISBN 978-3446210646
AS-Interface. The Actuator-Sensor-Interface for Automation
ISBN 978-3446210653
Werner Kriesel, O.W. Madelung, Carl Hanser Verlag Munich, Vienna 1999
- AS-Interface Complete Specification
Available from the AS-International Association
The address is:
AS-International Association
Zum Taubengarten 52
D-63571 Gelnhausen
Germany
Tel.: +49 - 6051 - 473212
Fax: +49 - 6051 - 473282
E-mail (<mailto:info@as-interface.net>)
(AS-i technology is promoted by the AS-International Association).
Internet address of the AS-International Association:
<http://www.as-interface.net>
- SIMATIC NET Industrial Communication for Automation and Drives
Catalog IK PI, Catalog IC 10, Catalog ST 70
The catalog can be obtained from any Siemens branch office or national company.
- SIMATIC
S7-1200 System Manual
(<http://support.automation.siemens.com/WW/view/de/36932465/0/en>) (order number: 6ES7298-8FA30-8BH0)

Order numbers

The order numbers for the Siemens documents listed above are listed in the catalogs "Industrial Communication and Field Devices, Catalog IK PI" and "SIMATIC Programmable Controllers SIMATIC S7 / M7 / C7 – Components for Totally Integrated Automation, Catalog ST70".

These catalogs as well as additional information can be requested from the local Siemens branch offices and national companies.

You will find many of the Siemens AG manuals on the Siemens Customer Support Internet site for automation:

<http://support.automation.siemens.com>

Enter the ID of the manual here as a search term. The ID is quoted in the reference in brackets.

Manuals that are included in the online documentation of the STEP 7 installation on your PG/PC can be found via the start menu (Start > SIMATIC > Documentation).

You will find an overview of the SIMATIC documentation on the Internet (<http://www.automation.siemens.com/mcms/topics/en/simatic/Pages/Default.aspx>)

Notes on CE marking

Product designation:

AS-i master CM 1243-2

Order No.: 3RK7243-2AA30-0XB0

AS-i data decoupling unit DCM 1271

Order No.: 3KR7271-1AA30-0AA0

EU EMC Directive 2004/108/EU

The above product fulfills the requirements of the EU EMC Directive 2004/108/EU "Electromagnetic compatibility"

The EU declaration of conformity is kept available for the competent authorities in accordance with the above-named EU directives at:

Siemens AG / I IA CE CP
Werner-von-Siemens-Straße 48
92220 Amberg, Germany

Field of application

The product meets the following requirements:

Field of application	Requirements for	
	Emitted interference	Interference immunity
Industry	EN 61000-6-4 : 2007	EN 61000-6-2 : 2005

If the product is used in the domestic environment, interference with other devices may occur.

Notes for machine manufacturers

This product is not a machine in the sense of the EU Machinery Directive. There is therefore no declaration of conformity relating to the EU Machinery Directive 98/37/EU for this product.

If the product is part of the equipment of a machine, the manufacturer of the machine must include it in the procedure for obtaining the declaration of conformity.

Glossary

APF

AS-i Power Fail. Flag or LED display that indicates that the supply voltage on the AS-i cable is too low or has failed (e.g. failure of the AS-i power supply unit).

AS-i (AS-Interface)

Actuator-sensor interface. A networking system for the lowest field level of the automation level. It is suitable for networking sensors and actuators with the controllers (previous designation: SINEC S1).

AS-i A/B slave

AS-i A/B slaves use the extended address range. Two A/B slaves each (in pairs) can be assigned to one address on AS-Interface; due to the address organization, up to 62 AS-i A/B slaves can thus be connected to AS-Interface.

AS-i analog slave

AS-i analog slaves are special AS-i standard slaves that exchange analog values with the AS-i master.

AS-i master

Via the AS-i master, the simplest binary sensors and actuators can be monitored and controlled via AS-i modules or AS-i slaves.

A distinction is made between the standard AS-i master and the extended AS-i master.

AS-i module

A module concept is defined for AS-Interface that supports the modular interlinking of AS-i slaves (e.g. sensors and actuators) via "AS-i modules".

These modules are of two types

The active AS-i module with integrated AS-i chip: This can be used to connect up to four conventional sensors and four conventional actuators.

The passive AS-i module: This acts as a distributor and permits connection of up to four sensors and actuators with integrated AS-i chip.

In accordance with the concept of the standard AS-i master and the extended AS-i master, the AS-i slaves use either AS-i chips with standard functionality or extended functionality.

AS-i slave

All stations that can be addressed by an AS-i master are referred to as AS-i slaves. AS-i slaves are distinguished according to their design (AS-i modules as well as sensors or actuators with integrated AS-i connection) and their addressing mode (AS-i standard slave and AS-i A/B slave with extended addressing mode).

AS-i standard slave

The AS-i standard slave occupies one address on AS-Interface; due to the address organization, up to 31 AS-i standard slaves can therefore be connected to AS-Interface.

CER

Configuration Error (display of configuration errors)

CM

Communication Module

Module for communication tasks that is used in an automation system as an interface expansion for the CPU.

CP

Communications Processor

Module for extended communication tasks that provides the CPU with additional interface types or communication possibilities.

CPU

Central Processing Unit

CTT

Combined Transaction Types

DIAG

Diagnosis

Extended AS-i master

An extended AS-i master supports 31 addresses that can be used for standard AS-i slaves or AS-i slaves with extended addressing mode. This extends the number of AS-i slaves that can be addressed to 62.

LAS

List of Activated Slaves

LDS

List of Detected Slaves

LED

A light-emitting diode that is used to display the signal status.

LPF

List of Peripheral Faults

LPS

List of Projected Slave

PF

Peripheral fault

Protected mode

In protected mode, the AS-i master only exchanges data with the configured AS-i slaves. "Configured" means that the slave addresses and configuration data stored in the AS-i master agree with the values of existing AS-i slaves.

Standard AS-i master

Up to 31 standard AS-i slaves or slaves with extended addressing mode (A slaves only) can be connected to one standard AS-i master.

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