ifm electronic

Supplementary device manual
Interface DeviceNet
in the AS-i ControllerE

ecomat300

AC1318
AC1324

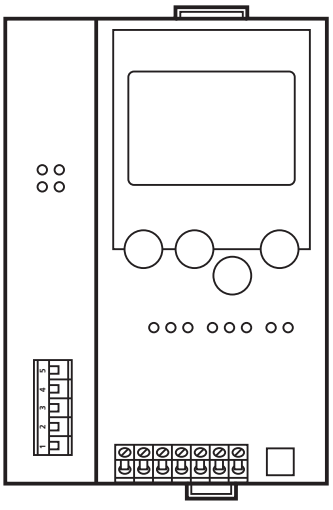
Master profile: M4

Firmware version RTS 2.x

Target from 15

CoDeSys version 2.3 or higher

English



7390708_02_UK 2012-02-29

Contents

1 On this manual

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In the additional "Programming Manual for CoDeSys V2.3" you will obtain more details about the use of the programming system "CoDeSys for Automation Alliance". This manual can be downloaded free of charge from **ifm's** website:
→ www.ifm.com > select your country > [Service] > [Download] > [Bus system AS-Interface]

Nobody is perfect. Send us your suggestions for improvements to this manual and you will receive a little gift from us to thank you.

1.1 What do the symbols and formats mean?

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The following symbols or pictograms depict different kinds of remarks in our manuals:

⚠ WARNING

Death or serious irreversible injuries are possible.

⚠ CAUTION

Slight reversible injuries are possible.

NOTICE

Property damage is to be expected or possible.

NOTE

Important notes on faults and errors.

Info

Further hints.

► ...	Required action
> ...	Response, effect
→ ...	"see"
abc	Cross references (links)
[...]	Designations of keys, buttons or display

1.2 What devices are described in this manual?

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This manual describes the AS-i controllerE family from **ifm electronic gmbh**.

- according to AS-i master specification 3.0 (M4)
- with a firmware from version RTS 2.3 onwards
- with the target from 15 onwards
- with the option DeviceNet fieldbus interface

In this supplementary manual only the above-mentioned DeviceNet fieldbus interface is described. Higher-level or general information → Basic device manual.

In the "programming manual CoDeSys 2.3" you will find more details how to use the programming system "CoDeSys for Automation Alliance". This manual can be downloaded free of charge from **ifm's** website at:
→ www.ifm.com > Select country > [Service] > [Download] > [Bus system AS-Interface]

1.3 How is this documentation structured?

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This documentation is a combination of different types of manuals. It is for beginners and also a reference for advanced users.

How to use this documentation:

- Refer to the table of contents to select a specific subject.
- The print version of the manual contains a search index in the annex.
- At the beginning of a chapter we will give you a brief overview of its contents.
- Abbreviations and technical terms are listed in the glossary.

In case of malfunctions or uncertainties please contact the manufacturer at:
→ www.ifm.com > select your country > [Contact].

We want to become even better! Each separate section has an identification number in the top right corner. If you want to inform us about any inconsistencies, please indicate this number with the title and the language of this documentation. Thank you for your support.

We reserve the right to make alterations which can result in a change of contents of the documentation. You can find the current version on **ifm's** website at:
→ www.ifm.com > select your country > [Service] > [Download] > [Bus system AS-Interface]

2 Safety instructions

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2.1 Important!

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No characteristics are warranted with the information, notes and examples provided in this manual. The drawings, representations and examples imply no responsibility for the system and no application-specific particularities.

The manufacturer of the machine/equipment is responsible for the safety of the machine/equipment.

⚠ WARNING

Property damage or bodily injury are possible when the notes in this manual are not adhered to! **ifm electronic gmbh** does not assume any liability in this regard.

- ► The acting person must have read and understood the safety instructions and the corresponding chapters of this manual before performing any work on or with this device.
- ► The acting person must be authorised to work on the machine/equipment.
- ► Adhere to the technical data of the devices!
  You can find the current data sheet on **ifm's** homepage at:
  → www.ifm.com > select your country > [Data sheet search] > (Article no.) > [Technical data in PDF format]
- ► Note the installation and wiring information as well as the functions and features of the devices!
  → supplied installation instructions or on **ifm's** homepage:
  → www.ifm.com > select your country > [Data sheet search] > (Article no.) > [Operating instructions]

NOTICE

The driver module of the serial interface can be damaged!

Disconnecting the serial interface while live can cause undefined states which damage the driver module.

- ► Do not disconnect the serial interface while live.

Start-up behaviour of the controller

The manufacturer of the machine/equipment must ensure with his application program that when the controller starts or restarts no dangerous movements can be triggered.

A restart can, for example, be caused by:

- voltage restoration after power failure
- reset after watchdog response because of too long a cycle time

2.2 What previous knowledge is required?

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This document is intended for people with knowledge of control technology and PLC programming with IEC 61131-3.

If this device contains a PLC, in addition these persons should know the CoDeSys® software.

The document is intended for specialists. These specialists are people who are qualified by their training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of a product. The document contains information about the correct handling of the product.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep the document during the entire duration of use of the device.

Adhere to the safety instructions.

3 System description

Contents

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3.1 Information about the device

10475

→ separate basic instructions of the device manual.

This manual describes the AS-i controllerE device family of **ifm electronic gmbh** with the option DeviceNet interface.

3.2 Overview: where is what?

10476

1. unlocking key for detaching the unit from a DIN rail
2. metal housing IP 20
3. text/graphics display → Basic manual
4. 4 pushbuttons → Basic manual
5. status LEDs (here: 2 AS-i masters) → Basic manual
6. 6-pole RJ11 socket of RS-232C as programming interface → Basic manual
7. terminals for the voltage supply 24 V, AS-i interface(s) and protective wire → Basic manual
8. DeviceNet fieldbus interface
9. status LEDs of the fieldbus interface → Status LEDs on the network connection (→ page 218)

Figure: Overview controllerE with DeviceNet interface
Here: AC1324

3.3 Information concerning the software

5043

→ separate basic instructions of the device manual

3.4 Required accessories

10478

Basic functions → separate basic instructions of the device manual.

For configuration and programming you also need:

- the software "CoDeSys for Automation Alliance" version 2.3 or higher (→ CD),
- for direct connection of the controllerE to a PC with serial interface:
  - programming cable article no. E70320.

4 Getting started

Contents

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4.1 Overview

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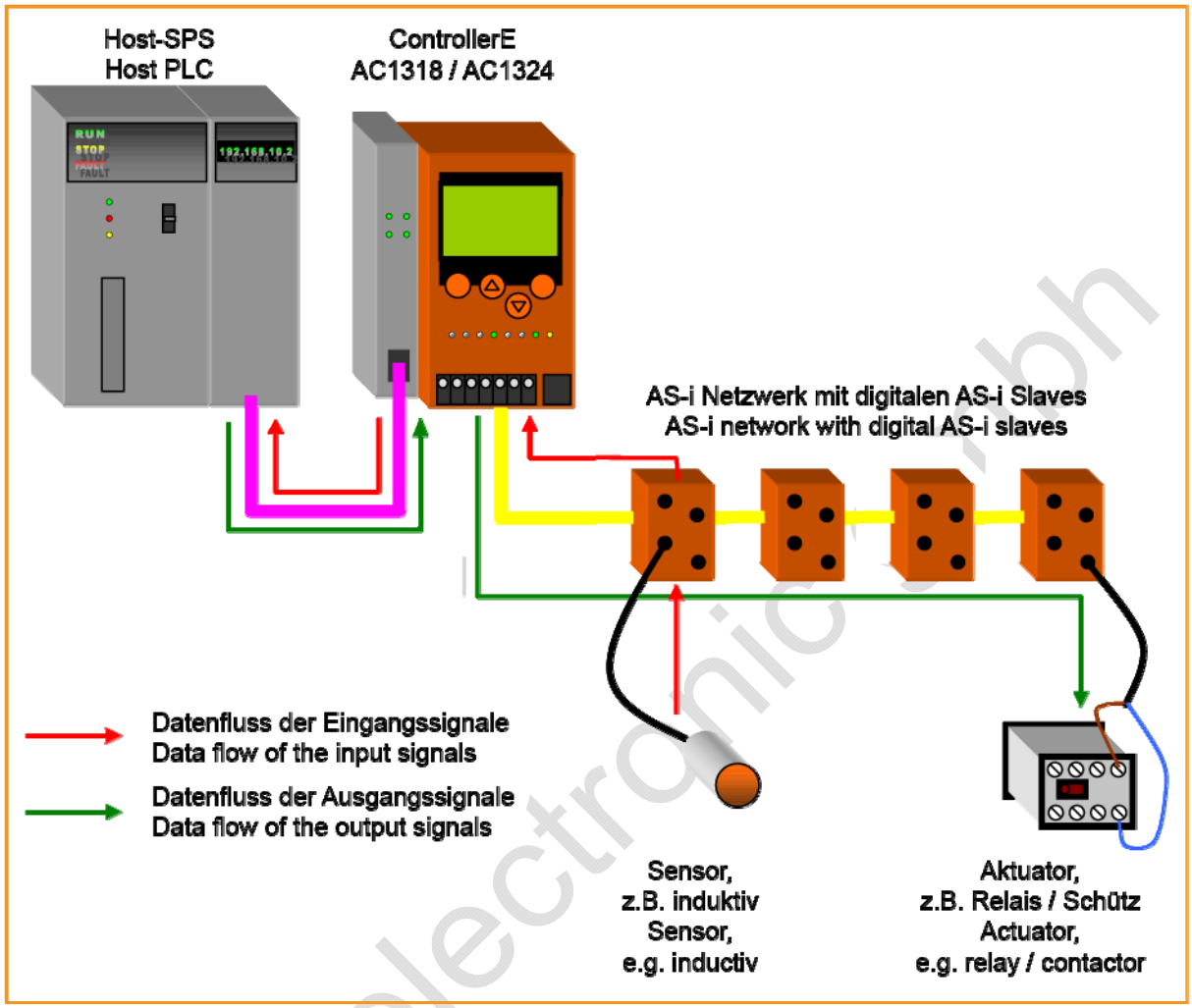
The chapter General setup (→ page 16) illustrates the general set-up procedure for the controllerE units AC1318 / AC1324 by means of 2 flowcharts. Possible error states and the corresponding corrective measures are described in additional tables in this chapter.

The chapter Connect Allen Bradley ControlLogix controller via DeviceNet (→ page 20) shows a configuration example of a connection between host controllers and the controllerE. These quick instructions presuppose the following:

- 16 bytes of digital input and 16 bytes of digital output data are to be exchanged between the connected host and the controllerE. Accordingly, the fieldbus modules 1 and 2 are both set to 16 bytes:
  → Chapter Module 1 – digital input master 1(A) (→ page 39),
  → Chapter Module 2 – digital output master 1(A) (→ page 41).
- The node address and the baud rate of the controllerE have been set as defined in the respective examples.
- The configuration PC is connected to the host controller.
- The controllerE and the DeviceNet scanner are switched on and connected to each other via DeviceNet.

The following figure is supposed to give an overview of the system structure and the corresponding data flow:



4.2 General setup

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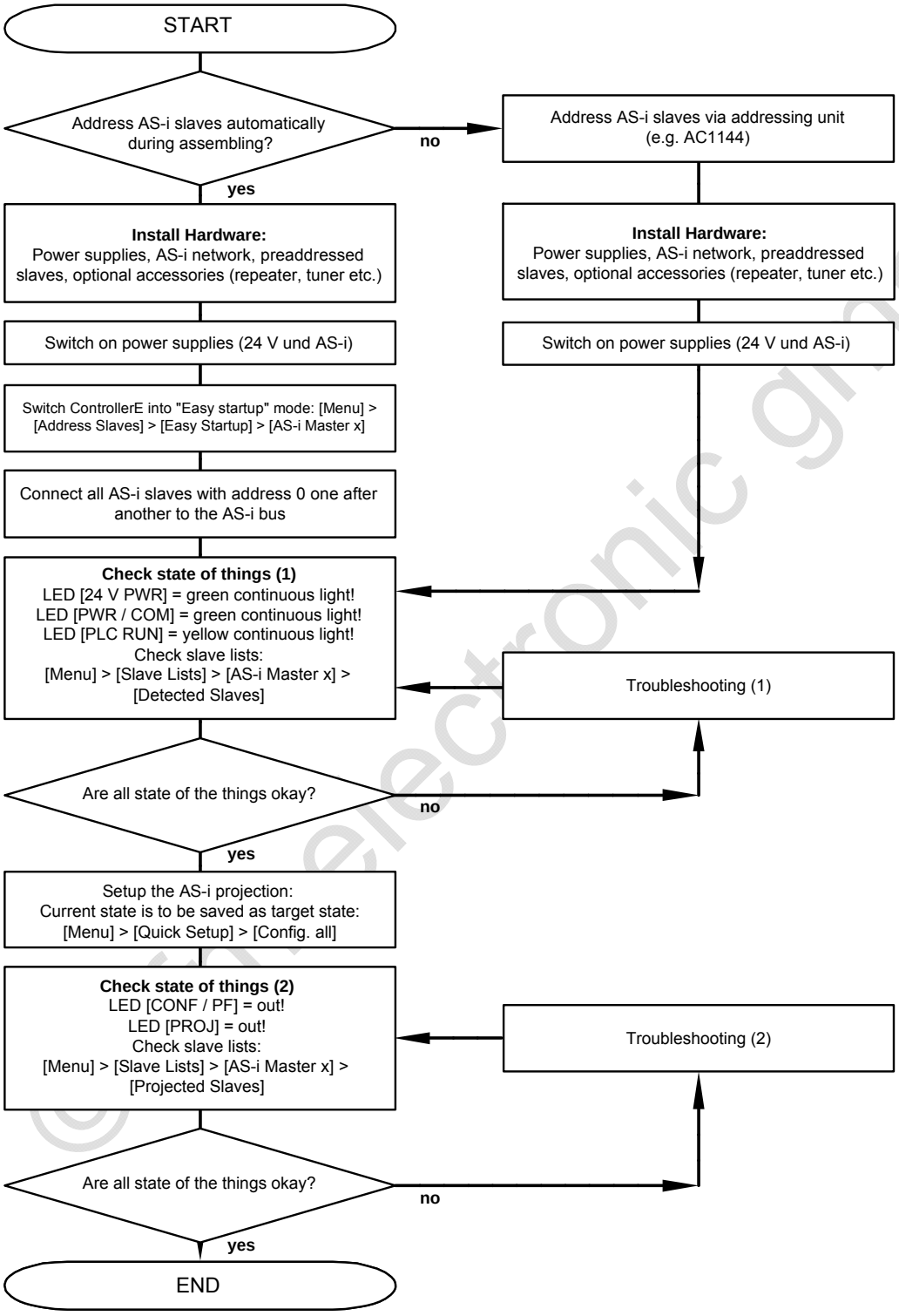

4.2.1 Troubleshooting (1)

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Checkpoint	Status	Possible cause	Remedy
LED [24 V PWR]	off	24 V voltage supply not ok.	► Check 24 V voltage supply!
LED [PWR / COM]	off	AS-i voltage supply not ok	► Check AS-i voltage supply!
	green flashing	AS-i voltage supply ok but no AS-i slave detected on the bus.	► Check wiring of the AS-i network! Adhere to the maximum admissible cable lengths!
LED [PLC RUN]	yellow flashing	controllerE PLC is in the operating mode STOP	► Switch PLC to the operating mode RUN: [Menu] > [PLC Setup] > [PLC Settings] > [Run] ► If no change is possible: Is the project "DN_M4_xxx.pro" stored in the controllerE as boot project? [Menü] > [PLC Setup] >]PLC info]
Slave lists (detected slaves)	The connected AS-i slaves are not detected correctly.	Wiring fault in the AS-i network	► Check wiring of the AS-i network! Adhere to the maximum admissible cable lengths!
		There is double addressing, i.e. two or more participants have been set to the same AS-i address.	► Check the addresses of the connected AS-i slaves!

4.2.2 Troubleshooting (2)

5038

Checkpoint	Condition	Possible cause	Remedy
LED [CONF / PF]	red flashing	one of the connected AS-i slaves causes a peripheral fault	► Read the error messages on the display of the controllerE and determine the concerned slave address(es)! ► Check in the corresponding installation instructions of the concerned slaves what might cause a peripheral fault in the corresponding unit! ► Remove this cause!
	red permanently lit (configuration error)	the list of activated slaves does not correspond to the list of projected slaves	► Check the wiring of the AS-i network, in particular the wiring of the slaves which are projected but not activated: [Menu] > [Slave Lists] > ... ► Adhere to the maximum admissible cable lengths!
		the configuration of the AS-i network was changed after executing the function "Config. all" (slave(s) added, slave(s) removed, slave(s) replaced by another type)	► Check the AS-i configuration! ► If the configuration is ok and the LED [CONF / PF] still is permanently lit: Repeat the function "Config. all": [Menu] > [Quick Setup] > [Config. all]
LED [PROJ]	yellow flashing	the AS-i master is in the projection mode. Switching to the protected mode is not possible because at least one slave with the address 0 was detected the bus	► Correct the AS-i configuration according to your requests! ► Repeat the function "Config. all": [Menu] > [Quick Setup] > [Config. all]
	permanent yellow light	the AS-i master is in the projection mode	► Switch the AS-i master to the "protected mode": [Menu] > [Master Setup] > [AS-i Master x] > [Operation Mode] > [Protect. Mode]

4.3 Fieldbus setup (overview)

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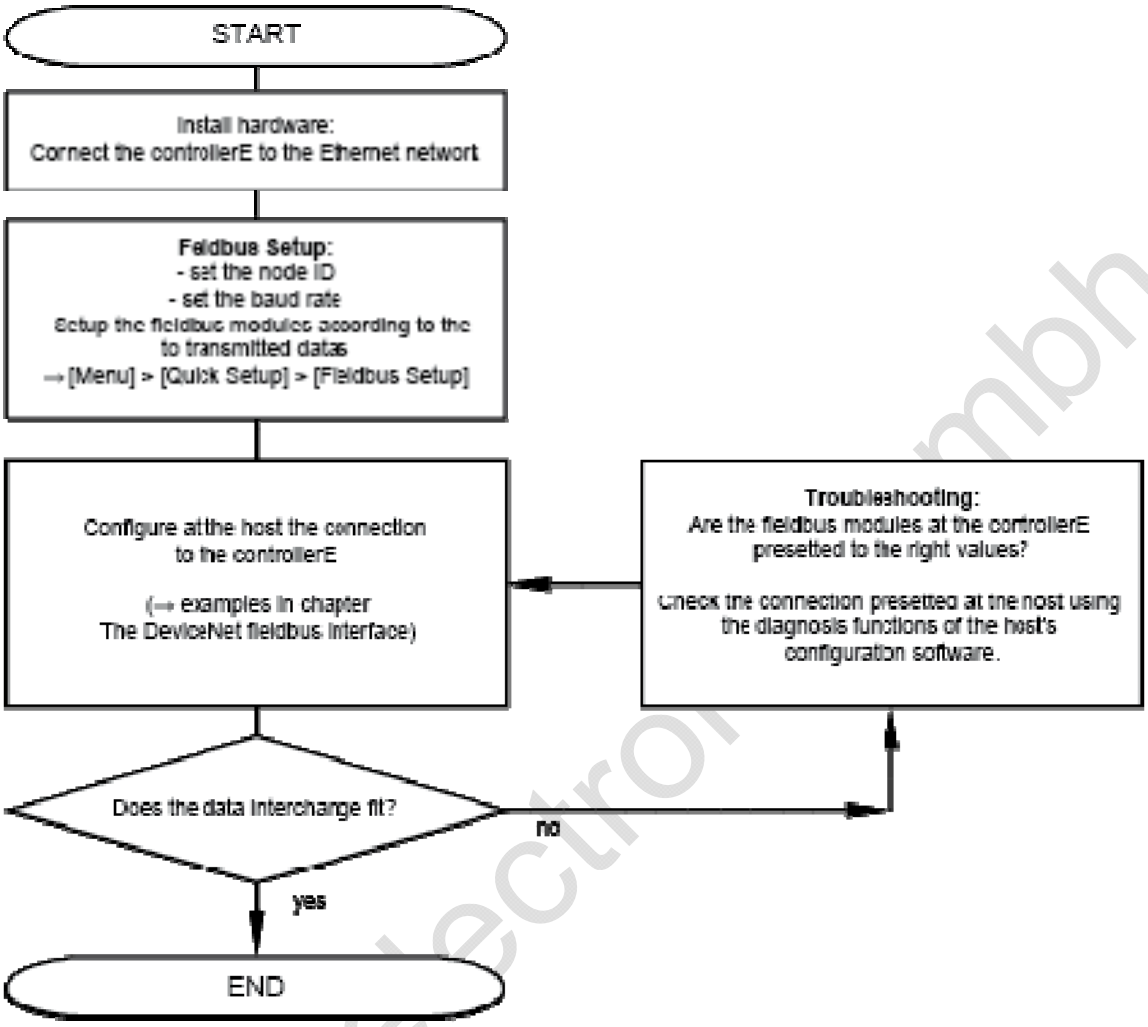

4.4 Connect Allen Bradley ControlLogix controller via DeviceNet

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4.4.1 Step 1 – start RSLogix5000

4426

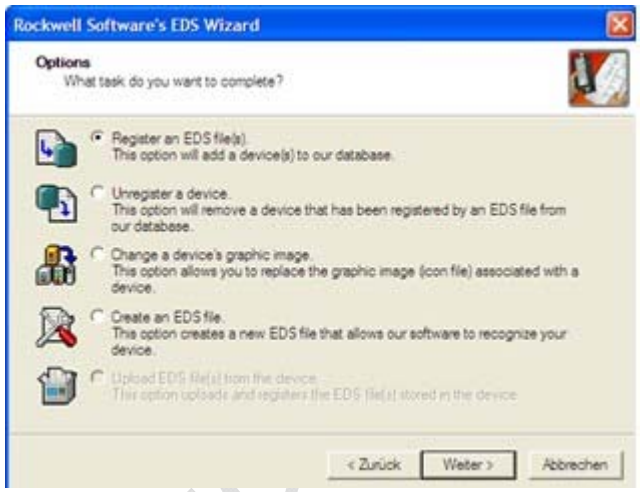
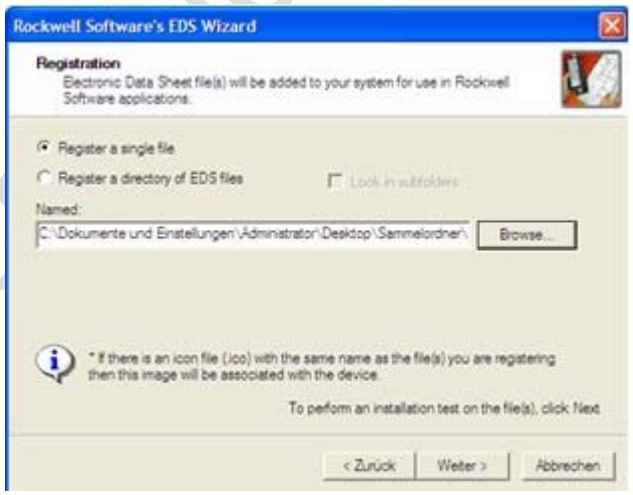
► Start the software on the PC.

4.4.2 Step 2 – register EDS file

10489

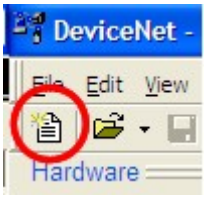
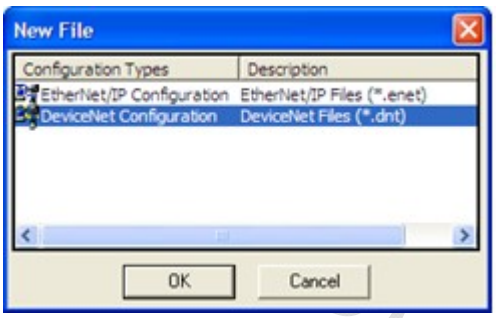
If the EDS file has already been registered:

► Skip step 2 and continue with Step 3 – create a new project (→ page 22).

Start EDS wizard: ► Select the menu [Tools] > [EDS wizard...]. > The EDS wizard appears (→ screenshot). ► Select the option [Register an EDS file(s)]. ► Confirm the selection with [Next].	
► Select the option [Register a single file]. ► Select the EDS file "`ifm DN ControllerE M4`" via [Browse…] and confirm with [Next]. ► Confirm all the other dialogue windows with [Next] or [Finish].	

4.4.3 Step 3 – create a new project

10490

Create a new project: ► Click on symbol [New] (→ screenshot) or: Select the menu [File] > [New...].	
► Select [DeviceNet Configuration]. ► Confirm with [OK].	

4.4.4 Step 4 – connect projection PC with the DeviceNet network

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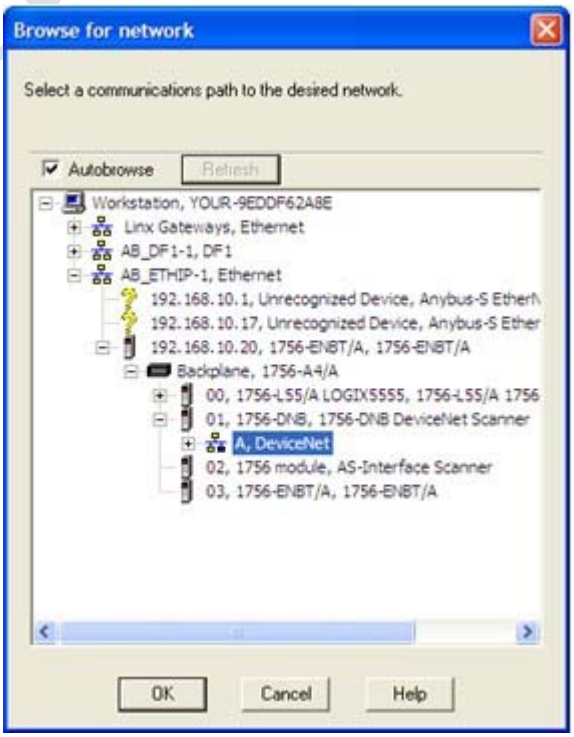
► Connect the PC with the network: Click on symbol [Online] (→ screenshot) or: Select the menu [Network] > [Online].	
► Select the communication path between the configuration PC and the DeviceNet network (→ example). **NOTE:**Depending on the type and number of the activated communication drivers, the dialogue [Browse for network] can differ considerably from the one shown in this figure. ► Confirm with [OK].	

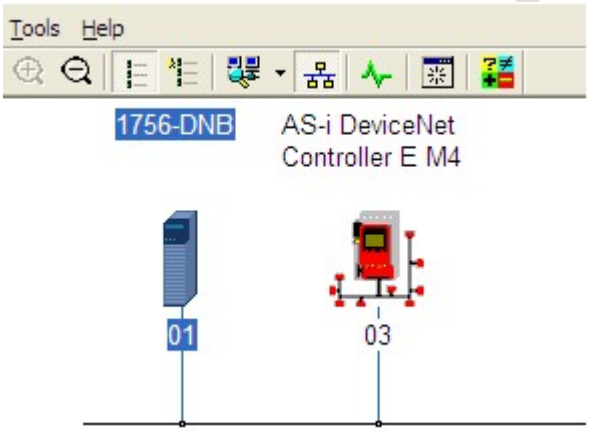
> The following message appears:
Upload or download device information before the devices can be configured online.

► Confirm with [OK]

> The DeviceNet network is scanned (→ screenshot).

► If all expected DeviceNet participants are detected, the scanning of the other DeviceNet addresses can be cancelled with [Cancel].

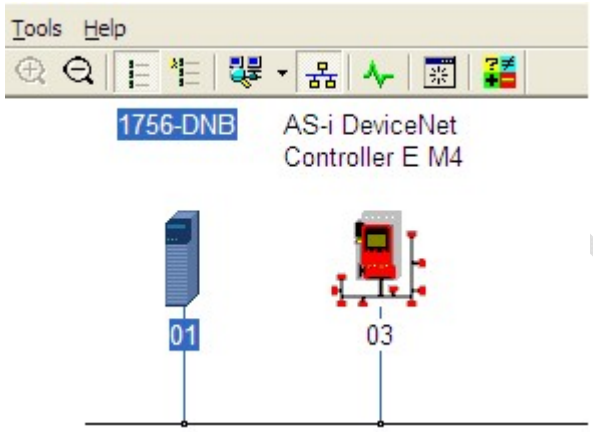
> Detected participants are displayed in a graphical overview.



4.4.5 Step 5 – see and change controllerE configuration

10502

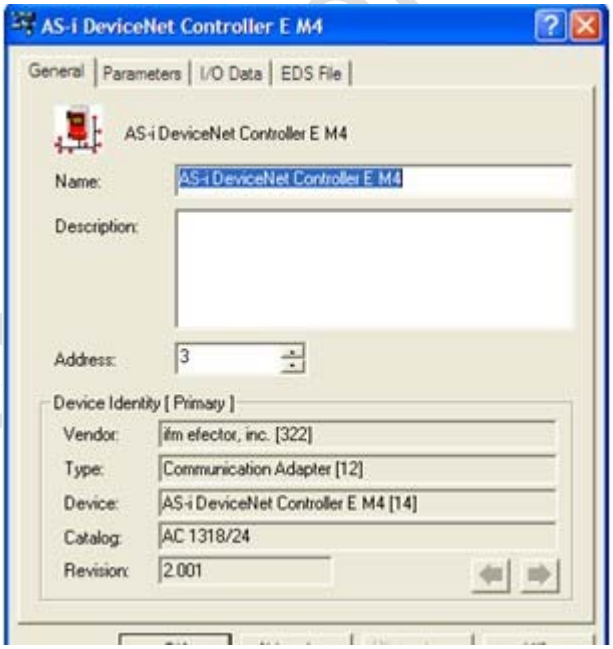
► Double-click on the symbol of the controllerE.



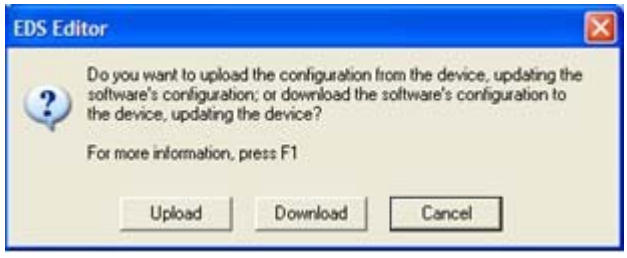
> The properties dialogue of the controllerE is displayed (→ screenshot):

► Change to tab [Parameters].

> The parameter information of the controllerE is displayed.



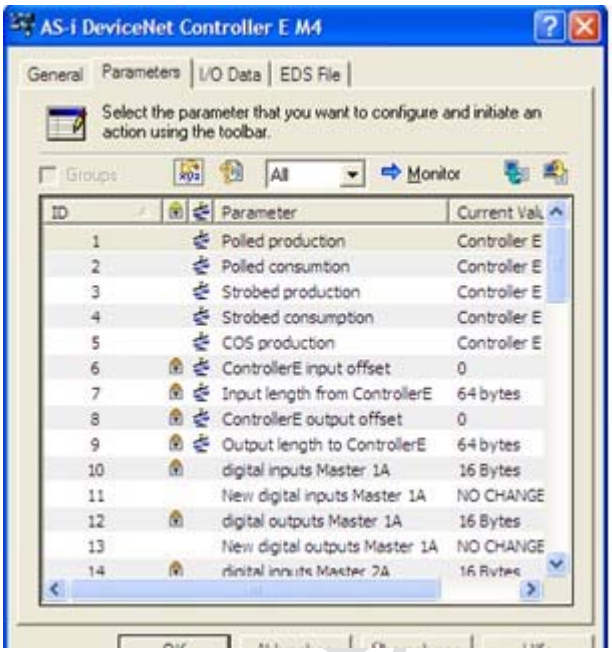
► Use [Upload] to copy the parameter data from the controllerE into the configuration software.



► The parameter data of the controllerE can be seen and edited.

INFO: The following values of the parameters are later required for the scanner configuration:
- [Input length from ControllerE]
- [Output length to ControllerE]

► With [OK] terminate the properties dialogue of the controllerE.



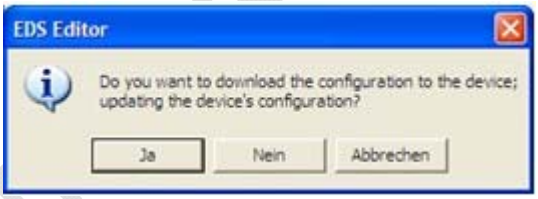
If parameters have been changed:

> The following message appears (→ screenshot):

► With [Yes] the changed parameters are transferred to the controllerE.

> The controllerE restarts the DeviceNet interface (Reset)

> The controllerE adopts the changed parameters.



4.4.6 Step 6 – add the controllerE in the DeviceNet scanner configuration

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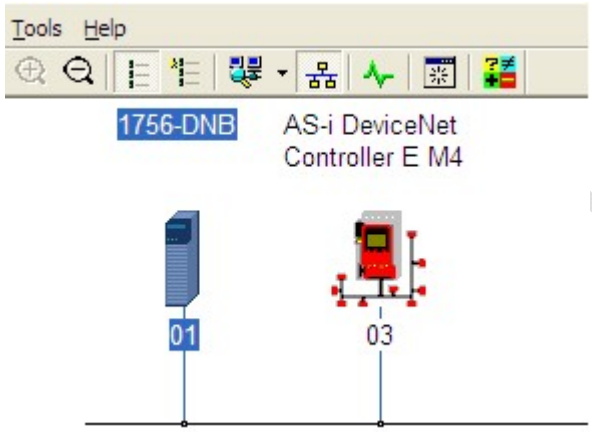
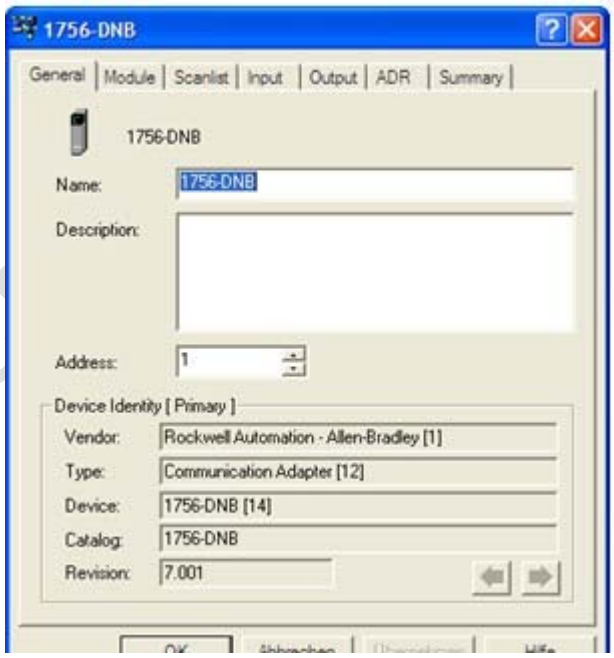
► Double-click on the symbol of the scanner (here: 1756-DNB).



> The properties window of the DeviceNet scanner is displayed (→ screenshot):

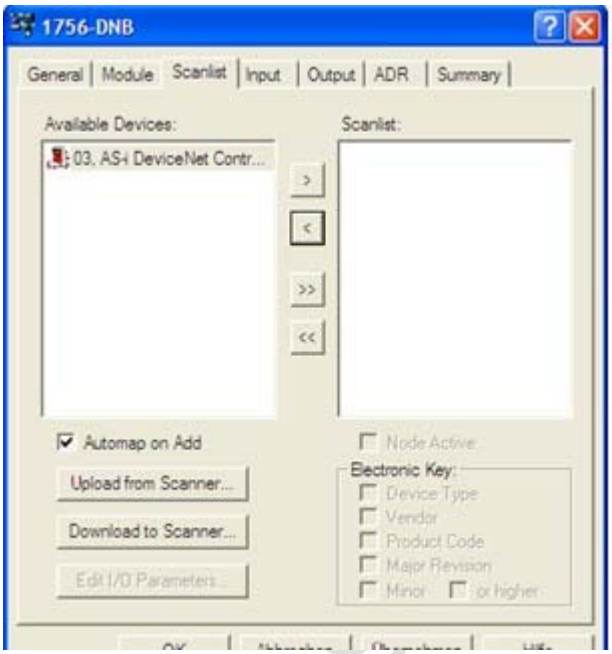
► Change to tab [Scanlist].

> The list of the nodes configured on the scanner is displayed.



► Use [Upload] to copy the configuration data from the DeviceNet scanner into the configuration software.

► Mark controllerE in the list [Available Devices] and add it to the list [Scanlist] with [>].



> The following message appears:
The controller has no input/output data.

► Confirm with [OK].

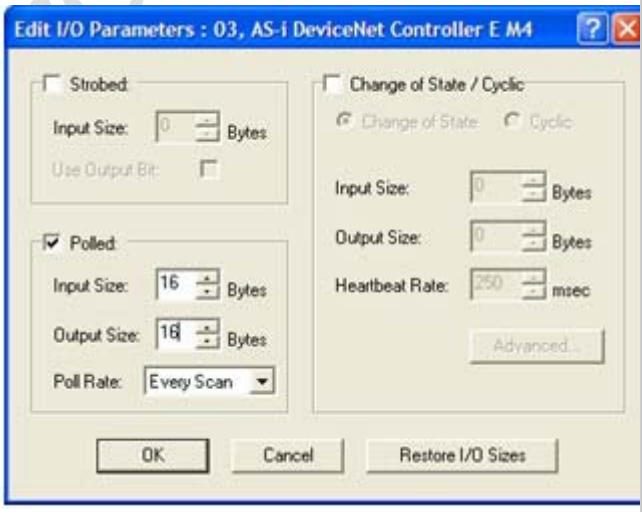
► Mark the controllerE in the list [Scanlist].
Click on the button [Edit I/O Parameters...].

► Activate the option [Polled].

► Enter the value of the parameter [Input length from ControllerE] into the field [Input size].

► Enter the value of the parameter [Output length to ControllerE] into the field [Output size].

► Confirm the entries with [OK].

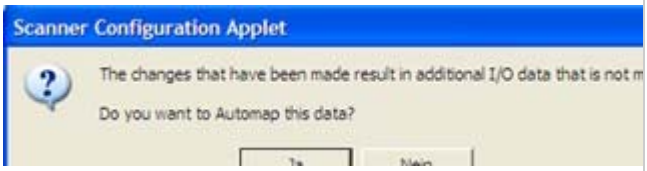


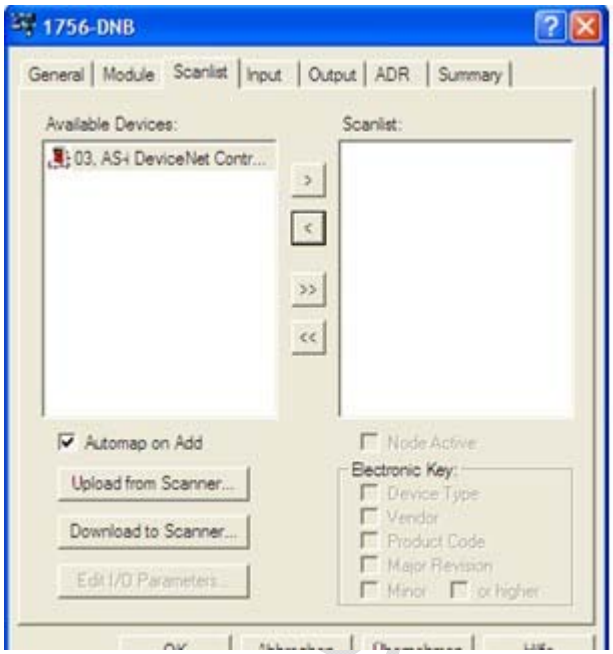
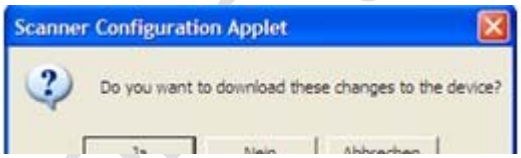
> The following message appears:
The entered connection values differ from the expected values.

► Confirm with [Yes].

> The following message appears (→ screenshot):

► Confirm with [Yes].



► Exit the scanner configuration window with [OK].	
> The following message appears (→ screenshot): ► Confirm with [Yes]. > The changed configuration is transferred to the DeviceNet scanner.	

4.4.7 Step 7 – store DeviceNet configuration

10520

Store the DeviceNet configuration:

► Click on symbol [Save] (→ screenshot)
or:
select the menu [File] > [Save]
or:
select the menu [File] > [Save as...]

4.4.8 Step 8 – generate new RSLogix project

10523

If there already is a project available to which a DeviceNet connection is to be added:

► Skip step 8 and continue with Step 9 – add a new module in the directory "I/O Configuration" (→ page 30)

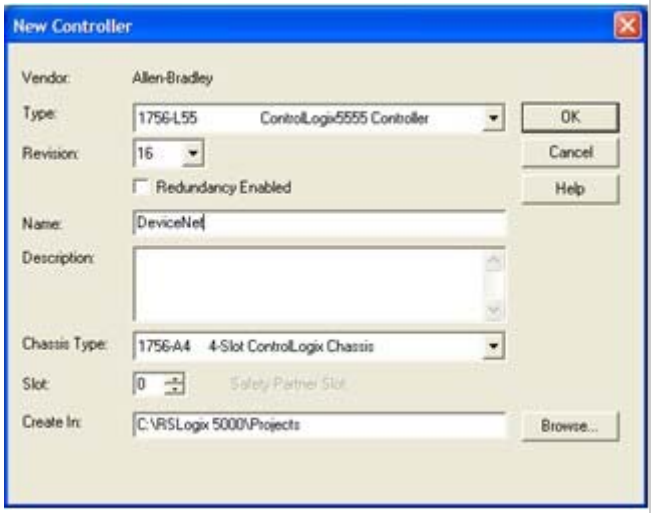
Create a new project:

► Click on symbol [New File] (→ screenshot)
or:
Menu [File] > [New...].

> The window [New Controller] appears.

► The following data is entered:

Term	Explanation
Type	Select CPU type
Revision	Select CPU version
Name	Project name
Description	Optional project description
Chassis Type	Select the type of rack
Slot	Select the position of the CPU in the rack
Create In	Enter project path in which the project is to be stored on the hard disk



► Terminate the entry with [OK].

> The new project is created.

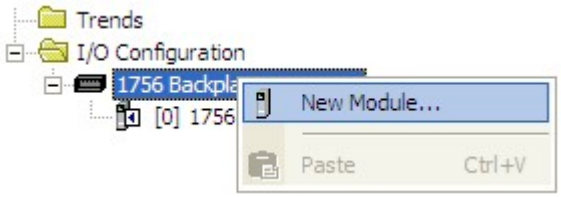
> The window [Application Browser] appears: (→ Step 3: Configure the Ethernet connection)

4.4.9 Step 9 – add a new module in the directory "I/O Configuration"

10525

► Click with the right mouse button on the device in the directory [`I/O Configuration`] (→ screenshot).

► Select [New Module...] in the displayed context menu



> The "Select Module" dialogue is displayed (→ screenshot).

► Select the module type used from the category " Communications"
here: module "1756-DNB"

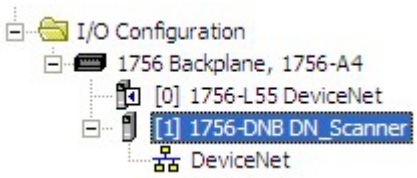
► Confirm with [OK].

> The [New Module] dialogue is displayed (→ screenshot).

► Enter the following data:

Term	Explanation
Name	Name for the module, here: "DN_Scanner"
Description	Optional description
Slot	Position of the DeviceNet scanner in the rack
Revision	Version of the DeviceNet scanner
Electronic Keying	If the entered version is to be compared with the actual version of the module: Set [Compatible Keying] or [Exact Match]. When [Disable Keying] is set, no comparison is made.
Input Size	Size of the input area seen from AB PLC in double words. Preset = 124 (maximum value) Example: 16 bytes of input data are to be transferred, it would thus be sufficient to set 4 double words.
Output Size	Size of the output area seen from AB PLC in double words. Preset = 123 (maximum value) Example: 16 bytes of output data are to be transferred, it would thus be sufficient to set 4 double words.

► Finish making entries with [OK].

> The result is displayed:	

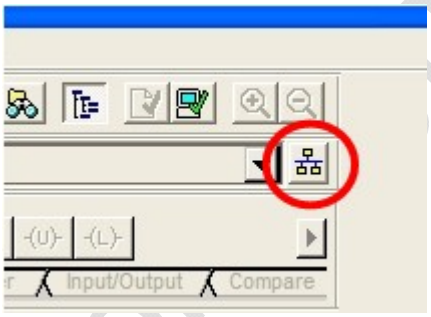
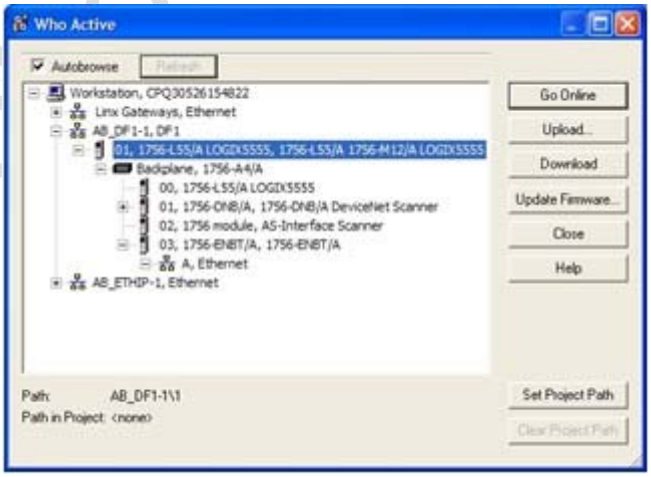
4.4.10 Step 10 – connect projection PC with the ContolLogix CPU

10534

Here, select the communication path for your application.

If the communication path has already been set:

► Skip this step 10 and continue with Step 11 – download of the created configuration to the ControlLogix PLC (→ page 32).

► Click on the symbol [Who Active].	
> The dialogue [Who Active] is displayed (→ screenshot). ► Select the right access path. **NOTE:** Depending on type and number of the activated communication drivers, the dialogue [Who Active] can differ considerably from the one shown in this figure. ► Adopt the setting with [Set Project Path]. ► Close the dialogue with [Close].	

4.4.11 Step 11 – download of the created configuration to the ControlLogix PLC

10535

► Click on the symbol [Controller Status] (→ screenshot).

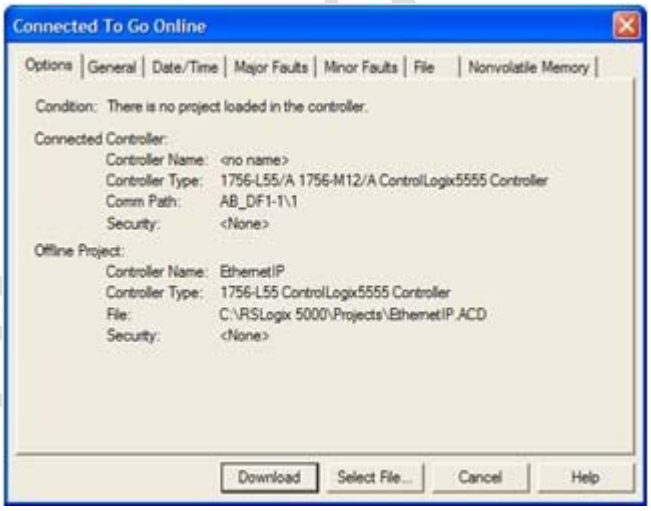
> The selection menu appears.

► Select [Go Online].

> The dialogue [Connected To Go Online] appears (→ screenshot).

► If not yet done:
Set the key switch of the CPU in the position [Prog] or [REM].

► Click on the button [Download].



> The dialogue [Download] appears (→ screenshot).

► Click on the button [Download].

> Ongoing data transmission.

► Set the CPU to the mode [Run]

4.4.12 Step 12 – check the data exchange between ControlLogix PLC and controllerE

10543

Can ControlLogix PLC and controllerE data be exchanged? Please check:

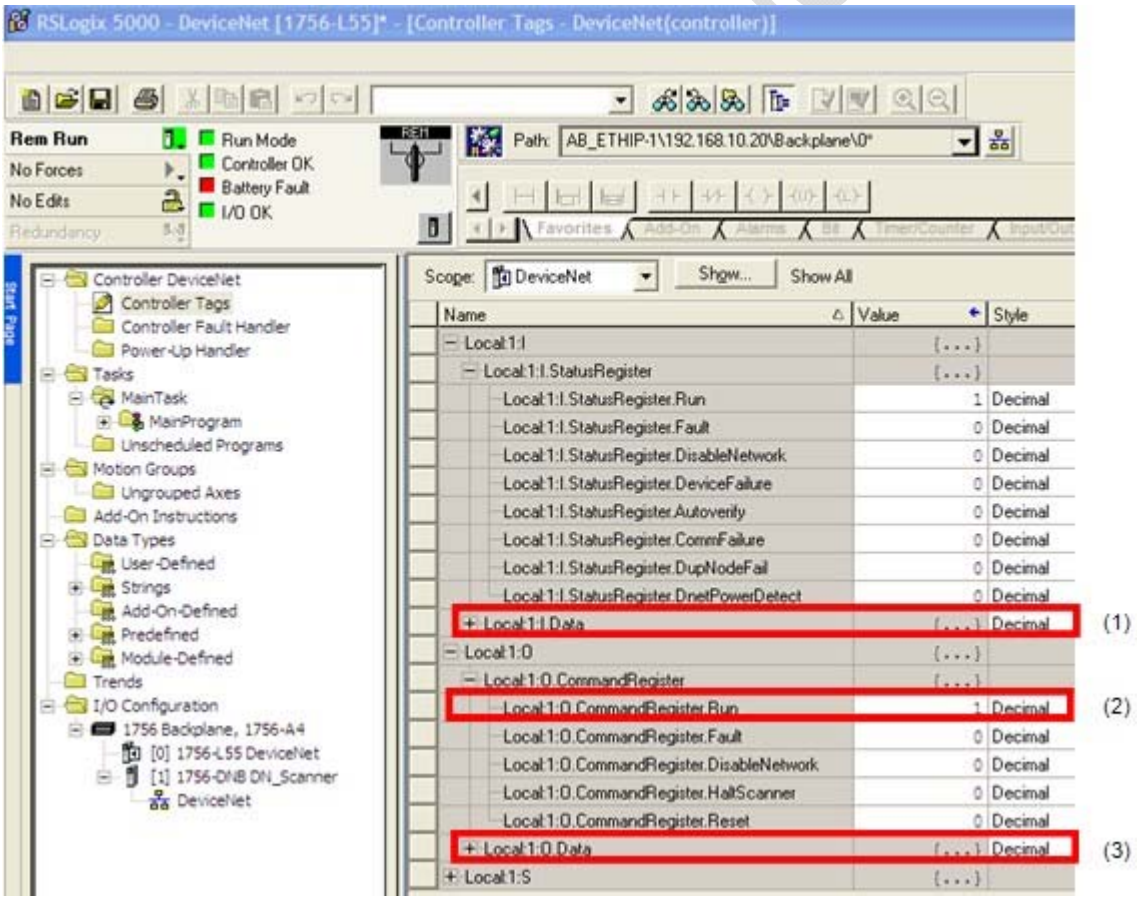
► Double click on the entry "Controller Tags".

Change the operating mode of the DeviceNet scanner from [IDLE] to [RUN]:

► Set the variable "CommandRegister.Run" to 1.

INFO: A data exchange between the ControlLogix PLC and the controllerE is only possible in the operating mode [RUN]. The variable „CommandRegister.Run" should be set in the application program of the ControlLogix PLC.

> The data exchange is displayed (→ screenshot below).



Legend:

(1) input signals from the controllerE
(2) CommandRegister.Run
(3) output signals to the controllerE

5 Function

Contents

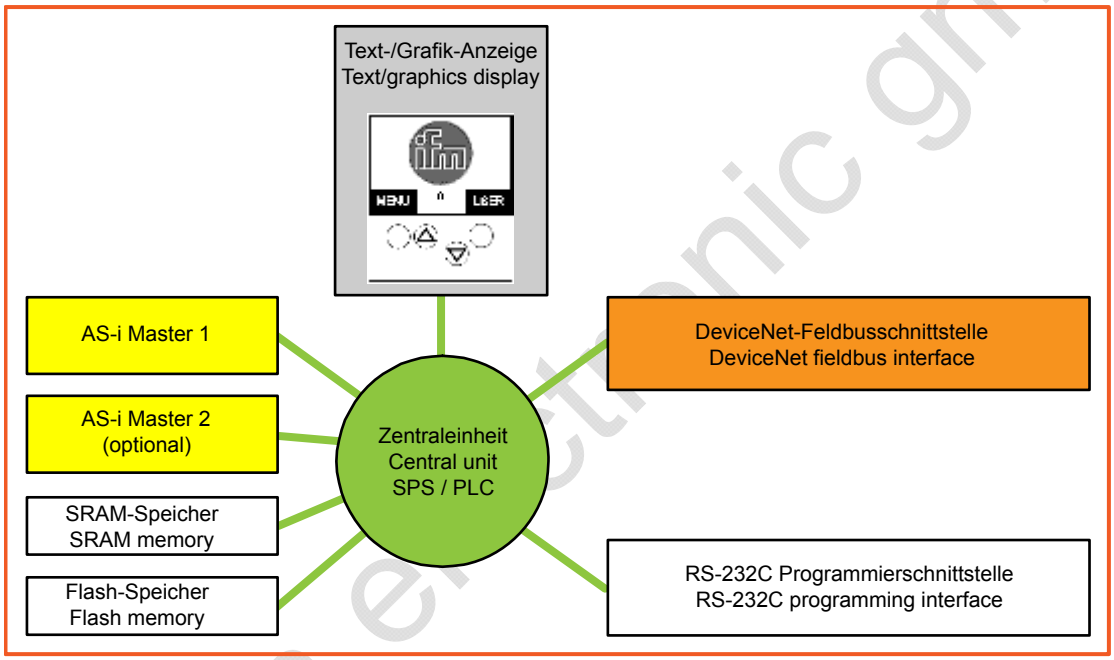
4440

Basic functions → separate basic instructions of the device manual

5.1 Data management

10548

The controllerE consists of different units:



This manual exclusively describes the following subject:

- With the optional **DeviceNet fieldbus interface**, the unit can be connected to other control systems.

5.2 The DeviceNet fieldbus interface

Contents

10551

The AS-i controllerE devices AC1318 and AC1324 have a DeviceNet fieldbus interface. Connection to the DeviceNet is made via a 5-pole Combicon connector with screw terminals.

The data exchange between DeviceNet fieldbus interface and the PLC function in the controllerE is carried out via a transfer memory (dual-ported RAM or short DPRAM) which contains maximum 512 bytes of input and output data respectively.

5.2.1 Connection of the hardware

10552

The controllerE devices AC1318 and AC1324 feature 5-pole Combicon connectors with screw terminals for the connection of the devices to DeviceNet.

Wiring diagram:

Contact	Signal
1	V-
2	CAN_L
3	SHIELD
4	CAN_H
5	V+

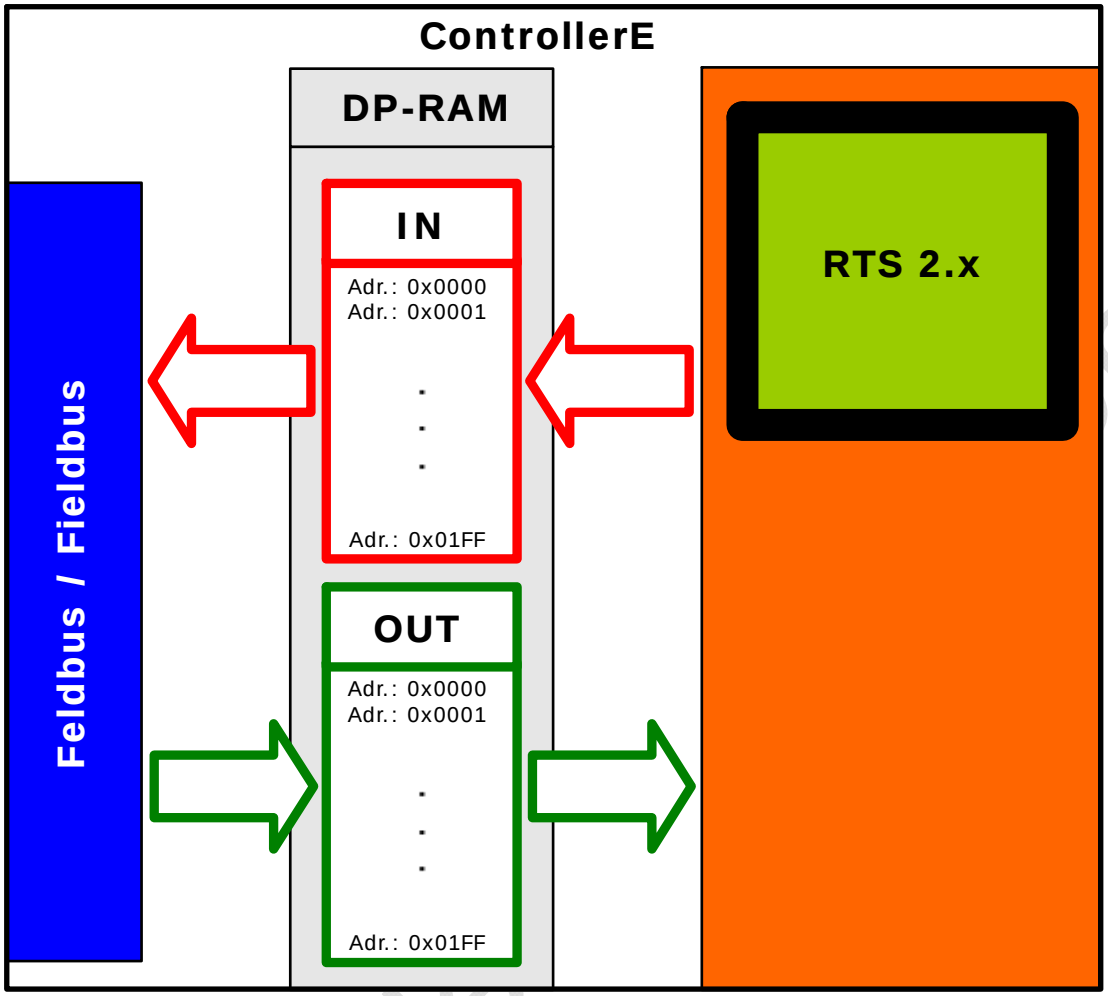
5.2.2 The dual-ported RAM

10553

In order to understand the settings of the fieldbus interface it is important to understand the function of the dual-ported RAM. The dual-ported RAM, in the following called DP-RAM, is a memory range which constitutes the interface between the controllerE data and the data of the fieldbus interface. The DP-RAM consists of two different ranges:

- the so-called **IN** range which provides data from the controllerE to the fieldbus interface (controllerE output data),
- the so-called **OUT** range which provides data from the fieldbus interface to the controllerE (controllerE input data).

The following figure is supposed to illustrate the correlations of the data flow:



5.3 The fieldbus modules

Contents

10555

As with all controllerE units with fieldbus interface, the information to be exchanged is subdivided into logical blocks: the so-called fieldbus modules - in the following called modules. These modules often have a variable size (data length). The contents, i.e. the data, of the modules depend on the type of information to be transmitted. The modules can be set, activated / deactivated in the user menu [Fieldbus Setup].

For the controllerE devices with DeviceNet fieldbus interface the fieldbus modules can also be set via the DeviceNet configuration software used. This is the so-called top-down configuration.
It is however also possible to read the settings made for the controllerE via the DeviceNet configuration software (so-called bottom-up configuration).

When activating modules with controllerE output data (data from the controllerE to the fieldbus interface), these data are consistently copied in their set lengths and in the sequence of the activated module numbers into the IN range of the DP-RAM.

The activation of modules with controllerE input data (data from the fieldbus interface to the controllerE) specifies how the data of the DP-RAM OUT range are to be interpreted by the controllerE. Here, the sequence of the activated module numbers and the set length are decisive again.

The Ethernet controllerE units provide 19 modules. The following table gives a quick overview of the modules and the setting options.

No.	Module	Direction of data	Possible settings	Information about the setting values	
1	digital input master 1(A)	C ⇒ F	0…16	0	deactivated
2	digital output master 1(A)	C ⇐ F			number of bytes
3	digital input master 2(A)	C ⇒ F			
4	digital output master 2(A)	C ⇐ F			
5	digital input master 1B	C ⇒ F			
6	digital output master 1B	C ⇐ F			
7	digital input master 2B	C ⇒ F			
8	digital output master 2B	C ⇐ F			
9	analogue multiplexed input	C ⇔ F	0 / 1	0	deactivated
10	analogue multiplexed output	C ⇔ F		1	activated
11	fieldbus data command channel	C ⇔ F			
12	fieldbus data PLC input	C ⇐ F	0…128	0	deactivated
13	fieldbus data PLC output	C ⇒ F			number of bytes
14	analogue input master 1	C ⇒ F	0…31	0	deactivated 4 words of analogue data respectively
15	analogue output master 1	C ⇐ F	0…17	0 17	deactivated 4 words of analogue data respectively 31x 4 words of analogue data
16	analogue input master 2	C ⇒ F	0…31	0	deactivated 4 words of analogue data respectively
17	analogue output master 2	C ⇐ F	0…17	0 17	deactivated 4 words of analogue data respectively 31x 4 words of analogue data
18	fieldbus data diagnosis	C ⇒ F	0 / 1 / 2	0 1 2	deactivated activated for master 1 activated for master 1 + 2
19	host command channel	C ⇔ F	0 / 1 / 2	0 1 2	deactivated activated (5 words) activated (18 words)

C ⇒ F	data from controllerE to fieldbus interface (controllerE output data)
C ⇐ F	data from fieldbus interface to controllerE (controllerE input data)
C ⇔ F	bidirectional data (controllerE output data as well as controllerE input data)

5.3.1 Module 1 – digital input master 1(A)

10588

Data content

10589

Binary input data of the digital single or A slaves of the AS-i master 1

Direction of data

10590

C ⇒ F Data from the controller to the fieldbus interface

Module settings

10591

Value range: 0…16 [bytes]

0	module is deactivated
1...16	module is activated (details → data interpretation)

Data interpretation

10592

In each transmitted byte, the digital signals of 2 AS-i slaves can be transmitted. The position of the data in this memory range depends on the AS-i address of the corresponding slave. Therefore the value to be set is based on the highest AS-i slave address of the used digital input slaves and not on the number of used slaves.

The following table shows the allocation of AS-i slave addresses to the module settings.
Given that the AS-i slave address 0 is not available for cyclical data exchange, this range is used for the transmission of status information of the AS-i master.

Setting value [Byte]	AS-i slave addresses							
1	Status master							1
2	2							3
3	4							5
4	6							7
5	8							9
6	10							11
7	12							13
8	14							15
Bit ⇒	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Setting value [Byte]	AS-i slave addresses							
9	16							17
10	18							19
11	20							21
12	22							23
13	24							25
14	26							27
15	28							29
16	30							31
Bit ⇒	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Status information AS-i master			
Bit 7	**Bit 6**	**Bit 5**	**Bit 4**
reserved	configuration error in the AS-i circuit or AS-i voltage too low	AS-i master offline (AS-i data is invalid)	periphery fault in the AS-i circuit

The data is stored as double words:

DW	double word																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
1	Byte 4							Byte 3									Byte 2								Byte 1							
2	Byte 8							Byte 7									Byte 6								Byte 5							
3	Byte 12							Byte 11									Byte 10								Byte 9							
4	Byte 16							Byte 15									Byte 14								Byte 13							
Bit byte	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

Examples for module 1

10593

Task 1:	The digital input signals of the AS-i slaves 1...3 are to be transmitted. To which value must module 1 be set at least?
Solution:	The highest used AS-i slave address is 3. According to the table, the data of the AS-i slave 3 are stored in byte 2 of the module. Therefore, module 1 must be at least set to the value 2.
Task 2:	The digital input signals of the AS-i slaves 2, 13 and 28 are to be transmitted. To which value must module 1 be set at least? Where can the data of slave 13 be found?
Solution:	The highest AS-i slave address used is 28. According to the table, the data of the AS-i slave 28 are stored in byte 15 of the module. Therefore, module 1 must be at least set to the value 15. The data of slave 13 are stored in byte 7 in the bits 0...3.

5.3.2 Module 2 – digital output master 1(A)

10556

Data content

10594

Binary output data of the digital single or A slaves of AS-i master 1

Direction of data

10595

C ⇐ F Data from the fieldbus interface to the controllerE

Module settings

10591

Value range: 0…16 [bytes]

0	module is deactivated
1...16	module is activated (details → data interpretation)

Data interpretation

10596

In each transmitted byte, the digital signals of 2 AS-i slaves can be transmitted. The position of the data in this memory range depends on the AS-i address of the corresponding slave. Therefore the value to be set is based on the highest AS-i slave address of the used digital output slaves and not on the number of used slaves.

The following table shows the allocation of AS-i slave addresses to the module settings.
The data range of AS-i slave address 0 is not used.

Setting value [byte]	AS-i slave addresses	
1	—	1
2	2	3
3	4	5
4	6	7
5	8	9
6	10	11
7	12	13
8	14	15
Bit ⇒	**7 6 5 4 3 2 1 0**	

Setting value [byte]	AS-i slave addresses	
9	16	17
10	18	19
11	20	21
12	22	23
13	24	25
14	26	27
15	28	29
16	30	31
Bit ⇒	**7 6 5 4 3 2 1 0**	

The data is stored as double words:

DW	double word																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
1	Byte 4								Byte 3								Byte 2								Byte 1							
2	Byte 8								Byte 7								Byte 6								Byte 5							
3	Byte 12								Byte 11								Byte 10								Byte 9							
4	Byte 16								Byte 15								Byte 14								Byte 13							
Bit byte	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

Examples for module 2

10597

Task 1:	The digital output signals of the AS-i slaves 1 and 2 are to be transmitted. To which value must module 2 be set?
Solution:	The highest used AS-i slave address is 2. According to the table, the data of the AS-i slave 2 are stored in byte 2 of the module. Therefore, module 2 must be at least set to the value 2.
Task 2:	The digital output signals of the AS-i slaves 5, 17 and 30 are to be transmitted. To which value must module 2 be set?
Solution:	The highest used AS-i slave address is 30. According to the table, the data of the AS-i slave 30 are stored in byte 16 of the module. Therefore, module 2 must be set to the value 16.

5.3.3 Module 3 – digital input master 2(A)

10601

Data content

10602

Binary input data of the digital single or A slaves of the AS-i master 2

Direction of data

10590

C ⇒ F Data from the controller to the fieldbus interface

Module settings

10591

Value range: 0…16 [bytes]

0	module is deactivated
1...16	module is activated (details → data interpretation)

Data interpretation, examples

10603

→ Module 1 – digital input master 1(A) (→ page 39)

5.3.4 Module 4 – digital output master 2(A)

10557

Data content

10605

Binary output data of the digital single or A slaves of the AS-i master 2

Direction of data

10595

C ⇐ F Data from the fieldbus interface to the controllerE

Module settings

10591

Value range: 0…16 [bytes]

0	module is deactivated
1...16	module is activated (details → data interpretation)

Data interpretation, examples

10606

→ Module 2 – digital output master 1(A) (→ page 41)

5.3.5 Module 5 – digital input master 1B

10608

Data content

10609

Binary input data of the digital B slaves of the AS-i master 1

Direction of data

10590

C ⇒ F Data from the controller to the fieldbus interface

Module settings

10591

Value range: 0…16 [bytes]

0	module is deactivated
1...16	module is activated (details → data interpretation)

Data interpretation

10610

In each transmitted byte, the digital signals of 2 AS-i slaves can be transmitted. The position of the data in this memory range depends on the AS-i address of the corresponding slave. Therefore the value to be set is based on the highest AS-i slave address of the used digital input slaves and not on the number of used slaves.

The following table shows the allocation of AS-i slave addresses to the module settings.
The data range of the AS-i slave address 0 is not used.

Setting value [Byte]	AS-i slave addresses	
1	—	1
2	2	3
3	4	5
4	6	7
5	8	9
6	10	11
7	12	13
8	14	15
Bit ⇒	**7 6 5 4 3 2 1 0**	

Setting value [Byte]	AS-i slave addresses	
9	16	17
10	18	19
11	20	21
12	22	23
13	24	25
14	26	27
15	28	29
16	30	31
Bit ⇒	**7 6 5 4 3 2 1 0**	

The data is stored as double words:

DW	double word																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
1	Byte 4								Byte 3								Byte 2								Byte 1							
2	Byte 8								Byte 7								Byte 6								Byte 5							
3	Byte 12								Byte 11								Byte 10								Byte 9							
4	Byte 16								Byte 15								Byte 14								Byte 13							
Bit byte	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

Examples for module 5

10611

→ Module 1 – digital input master 1(A) (→ page 39)

5.3.6 Module 6 – digital output master 1B

10613

Data content

10614

Binary output data of the digital B slaves of AS-i master 1

Direction of data

10595

C ⇐ F Data from the fieldbus interface to the controllerE

Module settings

10591

Value range: 0…16 [bytes]

0	module is deactivated
1...16	module is activated (details → data interpretation)

Data interpretation

10596

In each transmitted byte, the digital signals of 2 AS-i slaves can be transmitted. The position of the data in this memory range depends on the AS-i address of the corresponding slave. Therefore the value to be set is based on the highest AS-i slave address of the used digital output slaves and not on the number of used slaves.

The following table shows the allocation of AS-i slave addresses to the module settings.
The data range of AS-i slave address 0 is not used.

Setting value [byte]	AS-i slave addresses							
1	—							1
2	2							3
3	4							5
4	6							7
5	8							9
6	10							11
7	12							13
8	14							15
Bit ⇒	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

Setting value [byte]	AS-i slave addresses							
9	16							17
10	18							19
11	20							21
12	22							23
13	24							25
14	26							27
15	28							29
16	30							31
Bit ⇒	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**

The data is stored as double words:

DW	double word																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
1	Byte 4								Byte 3								Byte 2								Byte 1							
2	Byte 8								Byte 7								Byte 6								Byte 5							
3	Byte 12								Byte 11								Byte 10								Byte 9							
4	Byte 16								Byte 15								Byte 14								Byte 13							
Bit byte	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0

Examples for module 6

10615

→ Module 2 – digital output master 1(A) (→ page 41)

5.3.7 Module 7 – digital input master 2B

10617

Data content

10618

Binary input data of the digital B slaves of AS-i master 2

Direction of data

10590

C ⇒ F Data from the controller to the fieldbus interface

Module settings

10591

Value range: 0…16 [bytes]

0	module is deactivated
1...16	module is activated (details → data interpretation)

Data interpretation, examples

10619

→ Module 5 – digital input master 1B (→ page 45)

5.3.8 Module 8 – digital output master 2B

10621

Data content

10622

Binary output data of the digital B slaves of AS-i master 2

Direction of data

10595

C ⇐ F Data from the fieldbus interface to the controllerE

Module settings

10591

Value range: 0…16 [bytes]

0	module is deactivated
1...16	module is activated (details → data interpretation)

Data interpretation, examples

10623

→ Module 6 – digital output master 1B (→ page 47)

5.3.9 Additional notes on the modules 1...8

10578

As a standard the data is transferred in double words between the controllerE and the DeviceNet scanner. The data is displayed as follows:

n	double word (DW)																													
	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	Byte (n*4)+3								Byte (n*4)+2								Byte (n*4)+1								Byte (n*4)							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
0	Slave 6				Slave 7				Slave 4				Slave 5				Slave 2				Slave 3				(Status)				Slave 1			
1	Slave 14				Slave 15				Slave 12				Slave 13				Slave 10				Slave 11				Slave 8				Slave 9			
2	Slave 22				Slave 23				Slave 20				Slave 21				Slave 18				Slave 19				Slave 16				Slave 17			
3	Slave 30				Slave 31				Slave 28				Slave 29				Slave 26				Slave 27				Slave 24				Slave 25			

We recommend to set the setting values of the modules 1...8 to even values, otherwise a byte offset might occur in the following modules (→ the following example):

Example:

Setting value module 1 = 3
→ 3 Bytes of digital input data of the AS-i master 1

Setting value module 14 = 1
→ 4 Words of analogue input data from the AS-i master 1

This results in the following division of data:

	bad example																													
n	Data content																													
	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	analogue value 1 (low byte)								Slave 4				Slave 5				Slave 2				Slave 3				(Status)				Slave 1			
1	analogue value 3 (low byte)								analogue value 2																analogue value 1 (high byte)							
2	---								analogue value 4																analogue value 3 (high byte)							

As you can see in the table above, the uneven setting value of module 1 caused the analogue values to be "split".

If the setting value of module 1 is changed from "3" to "4", the data view is clearer (→ table below). Now, direct access to the analogue data in the host application is possible:

	good example																													
n	Data content																													
	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Slave 6				Slave 7				Slave 4				Slave 5				Slave 2				Slave 3				(Status)				Slave 1			
1	analogue value 2																analogue value 1															
2	analogue value 4																analogue value 3															

5.3.10 Setting "Number of channels per analogue slave"

10581

The parameter setting of the number of channels per analogue slave can be made separately for each of the following groups. One setting always applies to the complete group. A slave-specific assignment is not possible.

NOTE

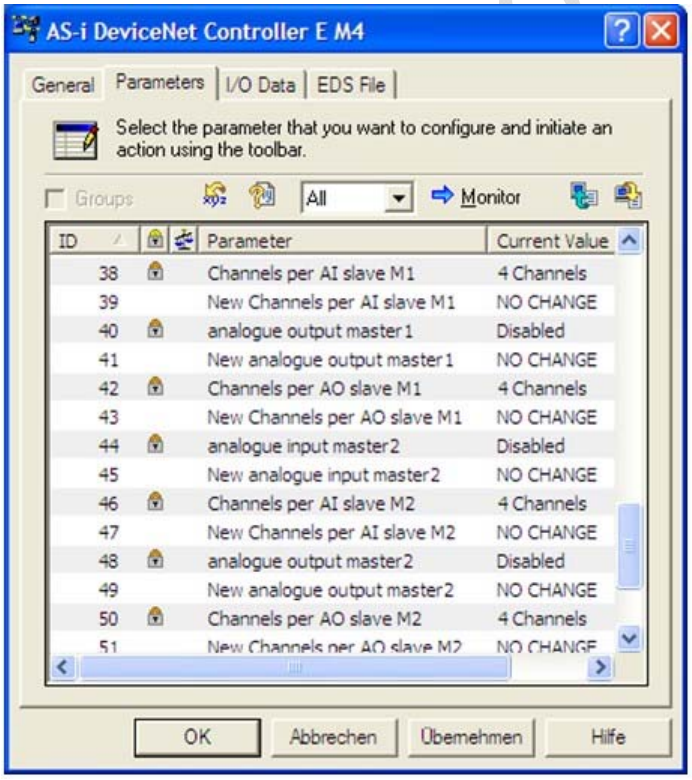
These parameters CANNOT be seen or edited via the controller menu.

They can only be seen or edited via the DeviceNet configuration software.
This is the so-called top-down configuration.

Group	Parameter ID	Possible setting values [Number of channels per slave]
analogue inputs of AS-i master 1	39	1 = 1 channel / slave 4 = 4 channels / slave *)
analogue outputs of AS-i master 1	43	1 = 1 channel / slave 4 = 4 channels / slave *)
analogue inputs of AS-i master 2	47	1 = 1 channel / slave 4 = 4 channels / slave *)
analogue outputs of AS-i master 2	51	1 = 1 channel / slave 4 = 4 channels / slave *)

*) preset

The following figure shows how the above-mentioned parameters are displayed.
Example: DeviceNet configuration software RSNetWorx for DeviceNet



5.3.11 Module 9 – analogue multiplexed input

10579

Data content

10625

Analogue input data of the slaves of the AS-i masters 1 + 2

The data of analogue input slaves with the following AS-i slave addresses can be directly read via the modules 14 and 16:

- 1...31 (setting = 4 channels per slave),
- 1...31 (setting = 1 channel per slave).

Change of the setting: → chapter Setting "Number of channels per analogue slave" (→ page 52)

So, module 9 only has to be used if the data cannot directly be read via the modules 14 or 16.
→ chapter Module 14 – analogue input master 1 (→ page 69)
→ chapter Module 16 – analogue input master 2 (→ page 83)

Direction of data

10626

C ⇔ F	Bidirectional (2 words = 4 bytes in both directions)

Module settings

10627

Value range = 0 / 1

0	module is deactivated
1	module is activated (details → data interpretation)

Data interpretation

10628

Using module 9, analogue input data of an AS-i slave with any AS-i address can be retrieved.

The information which channel of which AS-i slave on which master is to be read must be given to the controller via the fieldbus interface. The controller replies to such a request with a copy of the request data and the corresponding analogue value. As a result, only one specific analogue value can be transmitted at a time by module 9. This process is called multiplexing.

Request from host to AS-i master

10629

2 words from the fieldbus interface to the controller

DW	Data content																														
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		ST	SLA						reserved = 0						CC	

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	1 byte	slaves 0(A)...31(A): 00…$1F_{hex}$ = 0…31_{dec} slaves 1B...31B: 21…$3F_{hex}$ = 33…63_{dec}
CC	channel no.	2 bits	0...3_{hex} = 0...3_{dec} corresponds to the channel designations 1...4 (labelling on the unit)

Response from AS-i master to host

10631

2 words from the controller to the fieldbus interface

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	Analogue value (type = integer)																MM		ST	SLA					E7	E6	E5	E4	0	0	CC	

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	1 byte	slaves 0(A)...31(A): 00…$1F_{hex}$ = 0…31_{dec} slaves 1B...31B: 21…$3F_{hex}$ = 33…63_{dec}
E7	data exchange error	1 bit	0 = no error detected 1 = error: data exchange error with the slave (NOT transfer valid flag)
E6	no analogue slave	1 bit	0 = no error detected 1 = error: no analogue slave available on this AS-i address
E5	channel overflow	1 bit	0 = no error detected 1 = error: channel overflow (overflow flag)
E4	invalid channel	1 bit	0 = no error detected 1 = error: the selected channel is invalid
CC	channel no.	2 bits	0...3_{hex} = 0...3_{dec} corresponds to the channel designations 1...4 (labelling on the unit)

Example for module 9

10637

Task:	Channel 2 (according to the labelling on the unit) of the analogue input slave with the AS-i address 21 on master 2 is to be read.
Solution:	as follows:

Request from host to device

Word 1:

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Value	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1
Description	master 2		↓	Slave 21											channel 2	
		single slave														

Word 2: not used

Response from device to host

Word 1: Copy of word 1 of the request

Word 2: Analogue value (integer)

5.3.12 Module 10 – analogue multiplexed output

10584

Data content

10639

Analogue output data of the slaves of the AS-i masters 1 + 2

The data of analogue output slaves with the following AS-i slave addresses can be directly written via the modules 15 and 17:

- 1...31 (setting = 4 channels per slave),
- 1...31 (setting = 1 channel per slave).

Change of the setting: → chapter Setting "Number of channels per analogue slave" (→ page 52)

So, module 10 only has to be used if the data cannot directly be written via the modules 15 or 17.

If an analogue output is written simultaneously via the modules 10 and 15 or 17, the modules 15 or 17 have priority.
→ chapter Module 15 – analogue output master 1 (→ page 76)
→ chapter Module 17 – analogue output master 2 (→ page 84)

Direction of data

10626

C ⇔ F	Bidirectional (2 words = 4 bytes in both directions)

Module settings

10627

Value range = 0 / 1

0	module is deactivated
1	module is activated (details → data interpretation)

Data interpretation

10640

Using module 10, analogue output data of an AS-i slave with any AS-i address can be retrieved.

The information which channel of which AS-i slave on which master is to be written must be given to the controllerE via the fieldbus interface, in addition to the analogue value. The controllerE replies to such a request with a copy of the request data. As a result, only one specific analogue value can be transmitted at a time by module 10. This process is called multiplexing.

Request from host to AS-i master

10723

2 words from the fieldbus interface to the controller

DW	Data content																														
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	Analogue value (type = integer)																MM		ST	SLA					reserved = 0						CC	

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	1 byte	slaves 0(A)...31(A): $00…1F_{hex} = 0…31_{dec}$ slaves 1B...31B: $21…3F_{hex} = 33…63_{dec}$
CC	channel no.	2 bits	$0...3_{hex} = 0...3_{dec}$ corresponds to the channel designations 1...4 (labelling on the unit)

Response from AS-i master to host

10724

2 words from the controller to the fieldbus interface (copy of the request)

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	Analogue value (type = integer)																MM		ST	SLA					E7	E6	E5	E4	0	0	CC	

Legend:

MM	master no.	2 bits	01_{bin} = 1_{dec} = master 1 10_{bin} = 2_{dec} = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	1 byte	slaves 0(A)...31(A): 00…$1F_{hex}$ = 0…31_{dec} slaves 1B...31B: 21…$3F_{hex}$ = 33…63_{dec}
E7	data exchange error	1 bit	0 = no error detected 1 = error: data exchange error with the slave (NOT transfer valid flag)
E6	no analogue slave	1 bit	0 = no error detected 1 = error: no analogue slave available on this AS-i address
E5	channel overflow	1 bit	0 = no error detected 1 = error: channel overflow (overflow flag)
E4	invalid channel	1 bit	0 = no error detected 1 = error: the selected channel is invalid
CC	channel no.	2 bits	0...3_{hex} = 0...3_{dec} corresponds to the channel designations 1...4 (labelling on the unit)

Example for module 10

10641

Task:	Channel 4 (according to the labelling on the unit) of the analogue output slave with the AS-i address 12 on master 1 is to be set to the value 5000.
Solution:	as follows:

Request from host to device

Word 1:

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Value	0	1	0	0	1	1	0	0	0	0	0	0	0	0	1	1
Description	master 1		↓	slave 12											channel 4	
		single slave														

Word 2: analogue value = 5000

Response from device to host

Word 1: Copy of word 1 of the request

Word 2: Copy of word 2 of the request

5.3.13 Module 11 – fieldbus data command channel

10643

Data content

10644

Command channel data of the AS-i masters 1 + 2

For a detailed description of the handling of the fieldbus data command channel and the different commands → chapter The fieldbus command channel (module 11) (→ page 90).

Direction of data

10626

C ⇔ F	Bidirectional (2 words = 4 bytes in both directions)

Module settings

10627

Value range = 0 / 1

0	module is deactivated
1	module is activated (details → data interpretation)

Data interpretation

10645

The command channel gives the user the opportunity to read different data from the device or to access defined functions of the device via the fieldbus interface.

Commands in the module 11

10646

The following table provides an overview of the available commands:

Command no.	Description
1	read master flags
2	change operating mode
3	change current slave configuration
4	read projected slave configuration
5	change projected slave configuration
6	read current slave parameters
7	change projected slave parameters (default values)
8	read LAS (list of active slaves)
9	read LDS (list of detected slaves)
10	read LPF (list of slaves with periphery fault)
11	read LPS (list of projected slaves)
12	- reserved -
13	read telegram error counter of a slave
14	read configuration error counter
15	read AS-i cycle counter
16	change current slave parameters
17	- reserved -
18	- reserved -
19	Config all
20	- reserved -
21	save configuration in the flash memory
22	reset telegram error counter

5.3.14 Module 12 – fieldbus data PLC input

10585

Data content

10648

Up to 128 bytes of freely definable data

Direction of data

10595

C ⇐ F Data from the fieldbus interface to the controllerE

Module settings

10649

Value range = 0...128 [bytes]

0	module is deactivated
1...128	module is activated (details → data interpretation)

Data interpretation

10650

Module 12 contains the input data from the controller PLC's point of view, i.e. data which are for example sent by a higher-level PLC to the controller.

These data can be accessed via the PLC application program of the controller.

Access in the application program is carried out via the variables
- `PLC_Input[0]` to
- `PLC_Input[127]`.

In case of double word representation in the host PLC the following allocation of the individual bytes results:

Assignment double words – 128 bytes

10586

DW	double word																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW n	byte 4								byte 3								byte 2								byte 1							
n+1	byte 8								byte 7								byte 6								byte 5							
n+2	byte 12								byte 11								byte 10								byte 9							
n+3	byte 16								byte 15								byte 14								byte 13							
n+4	byte 20								byte 19								byte 18								byte 17							
n+5	byte 24								byte 23								byte 22								byte 21							
n+6	byte 28								byte 27								byte 26								byte 25							
n+7	byte 32								byte 31								byte 30								byte 29							
n+8	byte 36								byte 35								byte 34								byte 33							
n+9	byte 40								byte 39								byte 38								byte 37							
n+10	byte 44								byte 43								byte 42								byte 41							
n+11	byte 48								byte 47								byte 46								byte 45							
n+12	byte 52								byte 51								byte 50								byte 49							
n+13	byte 56								byte 55								byte 54								byte 53							
n+14	byte 60								byte 59								byte 58								byte 57							
n+15	byte 64								byte 63								byte 62								byte 61							
n+16	byte 68								byte 67								byte 66								byte 65							
n+17	byte 72								byte 71								byte 70								byte 69							
n+18	byte 76								byte 75								byte 74								byte 73							
n+19	byte 80								byte 79								byte 78								byte 77							
n+20	byte 84								byte 83								byte 82								byte 81							
n+21	byte 88								byte 87								byte 86								byte 85							
n+22	byte 92								byte 91								byte 90								byte 89							
n+23	byte 96								byte 95								byte 94								byte 93							
n+24	byte 100								byte 99								byte 98								byte 97							
n+25	byte 104								byte 103								byte 102								byte 101							
n+26	byte 108								byte 107								byte 106								byte 105							
n+27	byte 112								byte 111								byte 110								byte 109							
n+28	byte 116								byte 115								byte 114								byte 113							
n+29	byte 120								byte 119								byte 118								byte 117							
n+30	byte 124								byte 123								byte 122								byte 121							
n+31	byte 128								byte 127								byte 126								byte 125							

Example for module 12

10651

Task:	Process data (temperature, pressure, counter values etc.) with a total length of 14 words are to be transmitted from a higher-level PLC to the controller. To which value must module 12 be set?
Solution:	14 words = 28 bytes. Module 12 must be set to a length of at least 28 bytes in order to transmit all data. In case of space between the different process data in the transmitted range of the higher-level PLC, this must be taken into account for the data length in addition.

5.3.15 Module 13 – fieldbus data PLC output

10653

Data content

10648

Up to 128 bytes of freely definable data

Direction of data

10590

C ⇒ F Data from the controller to the fieldbus interface

Module settings

10649

Value range = 0...128 [bytes]

0	module is deactivated
1...128	module is activated (details → data interpretation)

Data interpretation

10655

Module 13 contains output data from the controller PLC's point of view, i.e. data transmitted by the controller e.g. to a higher-level PLC or a PC.

These data can be accessed via the PLC application program of the controller.

Access in the application program is carried out via the variables
- `PLC_Output[0]` to
- `PLC_Output[127]`.

In case of double word representation in the host PLC the following allocation of the individual bytes results:

Assignment double words – 128 bytes

10586

DW	double word																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW n	byte 4								byte 3								byte 2								byte 1							
n+1	byte 8								byte 7								byte 6								byte 5							
n+2	byte 12								byte 11								byte 10								byte 9							
n+3	byte 16								byte 15								byte 14								byte 13							
n+4	byte 20								byte 19								byte 18								byte 17							
n+5	byte 24								byte 23								byte 22								byte 21							
n+6	byte 28								byte 27								byte 26								byte 25							
n+7	byte 32								byte 31								byte 30								byte 29							
n+8	byte 36								byte 35								byte 34								byte 33							
n+9	byte 40								byte 39								byte 38								byte 37							
n+10	byte 44								byte 43								byte 42								byte 41							
n+11	byte 48								byte 47								byte 46								byte 45							
n+12	byte 52								byte 51								byte 50								byte 49							
n+13	byte 56								byte 55								byte 54								byte 53							
n+14	byte 60								byte 59								byte 58								byte 57							
n+15	byte 64								byte 63								byte 62								byte 61							
n+16	byte 68								byte 67								byte 66								byte 65							
n+17	byte 72								byte 71								byte 70								byte 69							
n+18	byte 76								byte 75								byte 74								byte 73							
n+19	byte 80								byte 79								byte 78								byte 77							
n+20	byte 84								byte 83								byte 82								byte 81							
n+21	byte 88								byte 87								byte 86								byte 85							
n+22	byte 92								byte 91								byte 90								byte 89							
n+23	byte 96								byte 95								byte 94								byte 93							
n+24	byte 100								byte 99								byte 98								byte 97							
n+25	byte 104								byte 103								byte 102								byte 101							
n+26	byte 108								byte 107								byte 106								byte 105							
n+27	byte 112								byte 111								byte 110								byte 109							
n+28	byte 116								byte 115								byte 114								byte 113							
n+29	byte 120								byte 119								byte 118								byte 117							
n+30	byte 124								byte 123								byte 122								byte 121							
n+31	byte 128								byte 127								byte 126								byte 125							

Example for module 13

10656

Task:	Process data with a total length of 50 bytes are to be transmitted by the controller to a higher-level PLC. To which value must module 13 be set?
Solution:	The data length is 50 bytes. Thus, module 13 must be set to a length of at least 50 bytes in order to transmit all data.

5.3.16 Module 14 – analogue input master 1

10658

Data content

10654

Analogue input data of the analogue slaves to AS-i master 1

With module 14 the data of the analogue input slaves on AS-i master 1 with the following AS-i slave addresses can be directly read:

- 1...31 (setting = 4 channels per slave),
- 1...31 (setting = 1 channel per slave).

Change of the setting: → chapter Setting "Number of channels per analogue slave" (→ page 52)

Shall an analogue input channel outside the above-mentioned ranges be read?

► Use the following module to read these data:
→ Module 9 – analogue multiplexed input (→ page 53)

Direction of data

10590

C ⇒ F	Data from the controller to the fieldbus interface

Module settings

10659

Value range = 0...31
- 4 words of data for 4 channels per slave
- 2 words of data for 1 channel per slave

0	module is deactivated
1...31	module is activated (details → data interpretation)

Data interpretation

10660

Input data for 4 channels per slave

10661

Value range	Sum of words	Word	Setting = 4 channels / slave			
			AS-i addr.	Channel	AS-i addr.	Channel
1	4	0	1	1	1A	1
		1		2		2
		2		3	1B	1
		3		4		2
2	8	4	2	1	2A	1
		5		2		2
		6		3	2B	1
		7		4		2
3	12	8	3	1	3A	1
		9		2		2
		10		3	3B	1
		11		4		2
4	16	12	4	1	4A	1
		13		2		2
		14		3	4B	1
		15		4		2
5	20	16	5	1	5A	1
		17		2		2
		18		3	5B	1
		19		4		2
6	24	20	6	1	6A	1
		21		2		2
		22		3	6B	1
		23		4		2
7	28	24	7	1	7A	1
		25		2		2
		26		3	7B	1
		27		4		2
8	32	28	8	1	8A	1
		29		2		2
		30		3	8B	1
		31		4		2

Value range	Sum of words	Word	Setting = 4 channels / slave			
			AS-i addr.	Channel	AS-i addr.	Channel
9	36	32	9	1	9A	1
		33		2		2
		34		3	9B	1
		35		4		2
10	40	36	10	1	10A	1
		37		2		2
		38		3	10B	1
		39		4		2
11	44	40	11	1	11A	1
		41		2		2
		42		3	11B	1
		43		4		2
12	48	44	12	1	12A	1
		45		2		2
		46		3	12B	1
		47		4		2
13	52	48	13	1	13A	1
		49		2		2
		50		3	13B	1
		51		4		2
14	56	52	14	1	14A	1
		53		2		2
		54		3	14B	1
		55		4		2
15	60	56	15	1	15A	1
		57		2		2
		58		3	15B	1
		59		4		2
16	64	60	16	1	16A	1
		61		2		2
		62		3	16B	1
		63		4		2
17	68	64	17	1	17A	1
		65		2		2
		66		3	17B	1
		67		4		2
18	72	68	18	1	18A	1
		69		2		2
		70		3	18B	1
		71		4		2

Value range	Sum of words	Word	Setting = 4 channels / slave			
			AS-i addr.	Channel	AS-i addr.	Channel
19	76	72	19	1	19A	1
		73		2		2
		74		3	19B	1
		75		4		2
20	80	76	20	1	20A	1
		77		2		2
		78		3	20B	1
		79		4		2
21	84	80	21	1	21A	1
		81		2		2
		82		3	21B	1
		83		4		2
22	88	84	22	1	22A	1
		85		2		2
		86		3	22B	1
		87		4		2
23	92	88	23	1	23A	1
		89		2		2
		90		3	23B	1
		91		4		2
24	96	92	24	1	24A	1
		93		2		2
		94		3	24B	1
		95		4		2
25	100	96	25	1	25A	1
		97		2		2
		98		3	25B	1
		99		4		2
26	104	100	26	1	26A	1
		101		2		2
		102		3	26B	1
		103		4		2
27	108	104	27	1	27A	1
		105		2		2
		106		3	27B	1
		107		4		2
28	112	108	28	1	28A	1
		109		2		2
		110		3	28B	1
		111		4		2

Value range	Sum of words	Word	Setting = 4 channels / slave			
			AS-i addr.	Channel	AS-i addr.	Channel
29	116	112	29	1	29A	1
		113		2		2
		114		3	29B	1
		115		4		2
30	120	116	30	1	30A	1
		117		2		2
		118		3	30B	1
		119		4		2
31	124	120	31	1	31A	1
		121		2		2
		122		3	31B	1
		123		4		2

Input data for 1 channel per slave

10662

Value range	Sum of words	Word	setting = 1 channel per slave	
			AS-i addr.	Channel
1	2	0	1(A)	1
		1	1B	1
2	4	2	2(A)	1
		3	2B	1
3	6	4	3(A)	1
		5	3B	1
4	8	6	4(A)	1
		7	4B	1
5	10	8	5(A)	1
		9	5B	1
6	12	10	6(A)	1
		11	6B	1
7	14	12	7(A)	1
		13	7B	1
8	16	14	8(A)	1
		15	8B	1
9	18	16	9(A)	1
		17	9B	1
10	20	18	10(A)	1
		19	10B	1
11	22	20	11(A)	1
		21	11B	1
12	24	22	12(A)	1
		23	12B	1

Value range	Sum of words	Word	setting = 1 channel per slave	
			AS-i addr.	Channel
13	26	24	13(A)	1
		25	13B	1
14	28	26	14(A)	1
		27	14B	1
15	30	28	15(A)	1
		29	15B	1
16	32	30	16(A)	1
		31	16B	1
17	34	32	17(A)	1
		33	17B	1
18	36	34	18(A)	1
		35	18B	1
19	38	36	19(A)	1
		37	19B	1
20	40	38	20(A)	1
		39	20B	1
21	42	40	21(A)	1
		41	21B	1
22	44	42	22(A)	1
		43	22B	1
23	46	44	23(A)	1
		45	23B	1
24	48	46	24(A)	1
		47	24B	1
25	50	48	25(A)	1
		49	25B	1
26	52	50	26(A)	1
		51	26B	1
27	54	52	27(A)	1
		53	27B	1
28	56	54	28(A)	1
		55	28B	1
29	58	56	29(A)	1
		57	29B	1
30	60	58	30(A)	1
		59	30B	1
31	62	60	31(A)	1
		61	31B	1

Examples for module 14

10663

Task 1:	The value 12 is specified for module 14. The setting for channels per slave is 1. What is the highest AS-i slave address whose data can be transmitted with this setting and how many words are transmitted in total?
Solution:	The highest AS-i slave address is 12. 24 words are transmitted. → Table Input data for 1 channel per slave (→ page 73).
Task 2:	To which minimum value must module 14 be set so that the data of the analogue input slave with the AS-i address 10 can be read (setting 4 channels per slave)? In which word within the range can the data of channel 3 of the said slave be found?
Solution:	The value to be set for module 14 is 10. The data of slave 10, channel 3 can be found in word 38 of the range. → Table Input data for 4 channels per slave (→ page 70).

5.3.17 Module 15 – analogue output master 1

10667

Data content

10668

Analogue output data of the analogue slaves to AS-i master 1

With module 15 the data of the analogue output slaves on AS-i master 1 with the following AS-i slave addresses can be directly written:

- 1...31 (setting = 4 channels per slave),
- 1...31 (setting = 1 channel per slave)

Change of the setting: → chapter Setting "Number of channels per analogue slave" (→ page 52)

Shall an analogue output channel outside the above-mentioned ranges be written?

► Use the following module to write this data:
→ Module 10 – analogue multiplexed output (→ page 57)

Direction of data

10595

C ⇐ F	Data from the fieldbus interface to the controllerE

Module settings

10669

Value range = 0...17
- 4 words of data for 4 channels per slave
- 2 words of data for 1 channel per slave

0	module is deactivated
1...17	module is activated (details → data interpretation)

Data interpretation

10660

Output data for 4 channels per slave

10670

Value range	Sum of words	Word	Setting = 4 channels / slave			
			AS-i addr.	Channel	AS-i addr.	Channel
17	124	0	1	1	1A	1
		1		2		2
		2		3	1B	1
		3		4		2
17	124	4	2	1	2A	1
		5		2		2
		6		3	2B	1
		7		4		2
17	124	8	3	1	3A	1
		9		2		2
		10		3	3B	1
		11		4		2
17	124	12	4	1	4A	1
		13		2		2
		14		3	4B	1
		15		4		2
17	124	16	5	1	5A	1
		17		2		2
		18		3	5B	1
		19		4		2
17	124	20	6	1	6A	1
		21		2		2
		22		3	6B	1
		23		4		2
17	124	24	7	1	7A	1
		25		2		2
		26		3	7B	1
		27		4		2
17	124	28	8	1	8A	1
		29		2		2
		30		3	8B	1
		31		4		2

Value range	Sum of words	Word	Setting = 4 channels / slave			
			AS-i addr.	Channel	AS-i addr.	Channel
17	124	32	9	1	9A	1
		33		2		2
		34		3	9B	1
		35		4		2
17	124	36	10	1	10A	1
		37		2		2
		38		3	10B	1
		39		4		2
17	124	40	11	1	11A	1
		41		2		2
		42		3	11B	1
		43		4		2
17	124	44	12	1	12A	1
		45		2		2
		46		3	12B	1
		47		4		2
17	124	48	13	1	13A	1
		49		2		2
		50		3	13B	1
		51		4		2
17	124	52	14	1	14A	1
		53		2		2
		54		3	14B	1
		55		4		2
17	124	56	15	1	15A	1
		57		2		2
		58		3	15B	1
		59		4		2
	4 (124)	0 (60)	16	1	16A	1
		1 (61)		2		2
		2 (62)		3	16B	1
		3 (63)		4		2
2 (17)	8 (124)	4 (64)	17	1	17A	1
		5 (65)		2		2
		6 (66)		3	17B	1
		7 (67)		4		2
3 (17)	12 (124)	8 (68)	18	1	18A	1
		9 (69)		2		2
		10 (70)		3	18B	1
		11 (71)		4		2

Value range	Sum of words	Word	Setting = 4 channels / slave			
			AS-i addr.	Channel	AS-i addr.	Channel
4 (17)	16 (124)	12 (72)	19	1	19A	1
		13 (73)		2		2
		14 (74)		3	19B	1
		15 (75)		4		2
5 (17)	20 (124)	16 (76)	20	1	20A	1
		17 (77)		2		2
		18 (78)		3	20B	1
		19 (79)		4		2
6 (17)	24 (124)	20 (80)	21	1	21A	1
		21 (81)		2		2
		22 (82)		3	21B	1
		23 (83)		4		2
7 (17)	28 (124)	24 (84)	22	1	22A	1
		25 (85)		2		2
		26 (86)		3	22B	1
		27 (87)		4		2
8 (17)	32 (124)	28 (88)	23	1	23A	1
		29 (89)		2		2
		30 (90)		3	23B	1
		31 (91)		4		2
9 (17)	36 (124)	32 (92)	24	1	24A	1
		33 (93)		2		2
		34 (94)		3	24B	1
		35 (95)		4		2
10 (17)	40 (124)	36 (96)	25	1	25A	1
		37 (97)		2		2
		38 (98)		3	25B	1
		39 (99)		4		2
11 (17)	44 (124)	40 (100)	26	1	26A	1
		41 (101)		2		2
		42 (102)		3	26B	1
		43 (103)		4		2
12 (17)	48 (124)	44 (104)	27	1	27A	1
		45 (105)		2		2
		46 (106)		3	27B	1
		47 (107)		4		2
13 (17)	52 (124)	48 (108)	28	1	28A	1
		49 (109)		2		2
		50 (110)		3	28B	1
		51 (111)		4		2

Value range	Sum of words	Word	Setting = 4 channels / slave			
			AS-i addr.	Channel	AS-i addr.	Channel
14 (17)	56 (124)	52 (112)	29	1	29A	1
		53 (113)		2		2
		54 (114)		3	29B	1
		55 (115)		4		2
15 (17)	60 (124)	56 (116)	30	1	30A	1
		57 (117)		2		2
		58 (118)		3	30B	1
		59 (119)		4		2
16 (17)	64 (124)	60 (120)	31	1	31A	1
		61 (121)		2		2
		62 (122)		3	31B	1
		63 (123)		4		2

Output data for 1 channel per slave

10671

Value range	Sum of words	Word	Setting = 1 channel per slave	
			AS-i addr.	Channel
17	62	0	1(A)	1
		1	1B	1
17	62	2	2(A)	1
		3	2B	1
17	62	4	3(A)	1
		5	3B	1
17	62	6	4(A)	1
		7	4B	1
17	62	8	5(A)	1
		9	5B	1
17	62	10	6(A)	1
		11	6B	1
17	62	12	7(A)	1
		13	7B	1
17	62	14	8(A)	1
		15	8B	1
17	62	16	9(A)	1
		17	9B	1
17	62	18	10(A)	1
		19	10B	1
17	62	20	11(A)	1
		21	11B	1
17	62	22	12(A)	1
		23	12B	1

Value range	Sum of words	Word	Setting = 1 channel per slave	
			AS-i addr.	Channel
17	62	24	13(A)	1
		25	13B	1
17	62	26	14(A)	1
		27	14B	1
17	62	28	15(A)	1
		29	15B	1
1 (17)	2 (62)	0 (30)	16(A)	1
		1 (31)	16B	1
2 (17)	4 (62)	2 (32)	17(A)	1
		3 (33)	17B	1
3 (17)	6 (62)	4 (34)	18(A)	1
		5 (35)	18B	1
4 (17)	8 (62)	6 (36)	19(A)	1
		7 (37)	19B	1
5 (17)	10 (62)	8 (38)	20(A)	1
		9 (39)	20B	1
6 (17)	12 (62)	10 (40)	21(A)	1
		11 (41)	21B	1
7 (17)	14 (62)	12 (42)	22(A)	1
		13 (43)	22B	1
8 (17)	16 (62)	14 (44)	23(A)	1
		15 (45)	23B	1
9 (17)	18 (62)	16 (46)	24(A)	1
		17 (47)	24B	1
10 (17)	20 (62)	18 (48)	25(A)	1
		19 (49)	25B	1
11 (17)	22 (62)	20 (50)	26(A)	1
		21 (51)	26B	1
12 (17)	24 (62)	22 (52)	27(A)	1
		23 (53)	27B	1
13 (17)	26 (62)	24 (54)	28(A)	1
		25 (55)	28B	1
14 (17)	28 (62)	26 (56)	29(A)	1
		27 (57)	29B	1
15 (17)	30 (62)	28 (58)	30(A)	1
		29 (59)	30B	1
16 (17)	32 (62)	30 (60)	31(A)	1
		31 (61)	31B	1

Examples for module 15

10674

Task 1:	The value 7 is specified for module 15. The setting for channels per slave is 1. The data of which AS-i slave addresses is transmitted and in how many words?
Solution:	The highest AS-i slave address is 22. 14 words are transmitted. → Table Output data for 1 channel per slave (→ page 80)
Task 2:	To which minimum value must module 15 be set so that data can be written to the analogue output slave with the AS-i address 19 (setting = 4 channels per slave)? In which word within the range can the data of channel 2 of the said slave be found?
Solution:	The value to be set for module 15 is 4. The data of slave 19, channel 2 can be found in word 13 of the range. → Table Output data for 4 channels per slave (→ page 77)

5.3.18 Module 16 – analogue input master 2

10676

Data content

10677

Analogue input data of the analogue slaves to AS-i master 2

With module 16 the data of the analogue input slaves on AS-i master 2 with the following AS-i slave addresses can be directly read:

- 1...31 (setting = 4 channels per slave),
- 1...31 (setting = 1 channel per slave).

Change of the setting: → chapter Setting "Number of channels per analogue slave" (→ page 52)

Shall an analogue input channel outside the above-mentioned ranges be read?

► Use the following module to read this data:
→ Module 9 – analogue multiplexed input (→ page 53)

Direction of data

10590

C ⇒ F	Data from the controller to the fieldbus interface

Module settings

10678

Value range = 0…31 (4 words of data)

0	module is deactivated
1...31	module is activated (details → data interpretation)

Data interpretation, examples

10679

→ Module 14 – analogue input master 1 (→ page 69)

5.3.19 Module 17 – analogue output master 2

10681

Data content

10682

Analogue output data of the analogue slaves to AS-i master 2

With module 17 the data of the analogue output slaves on AS-i master 2 with the following AS-i slave addresses can be directly read:

- 1...31 (setting = 4 channels per slave),
- 1...31 (setting = 1 channel per slave).

Change of the setting: → chapter Setting "Number of channels per analogue slave" (→ page 52)

Shall an analogue output channel outside the above-mentioned ranges be written?

► Use the following module to write this data:
→ Module 10 – analogue multiplexed output (→ page 57)

Direction of data

10595

C ⇐ F	Data from the fieldbus interface to the controllerE

Module settings

10683

Value range = 0…17 (4 words of data)

0	module is deactivated
1...17	module is activated (details → data interpretation)

Data interpretation, examples

10684

→ Module 15 – analogue output master 1 (→ page 76)

5.3.20 Module 18 – fieldbus diagnostic data

10686

Data content

10687

Diagnostic data of the AS-i masters 1 and 2

Direction of data

10590

C ⇒ F Data from the controller to the fieldbus interface

Module settings

10688

Value range = 0...2

0	module is deactivated
1	module is activated 13 words of diagnostic data from AS-i master 1
2	module is activated 13 words of diagnostic data from AS-i master 1 13 words of diagnostic data from AS-i master 2

Data interpretation

10689

General overview diagnostic range

10690

Word	Description
0	AS-i master 1: master flags
1...4	AS-i master 1: configuration error
5...8	AS-i master 1: periphery fault (LPF)
9...12	AS-i master 1: list of projected slaves (LPS)
13	AS-i master 2: master flags
14...17	AS-i master 2: configuration error
18...21	AS-i master 2: periphery fault (LPF)
22...25	AS-i master 2: list of projected slaves (LPS)

Details master flags

10691

Bit	Name according to AS-i specification	Description
0	WdRS232:	watchdog is activated for the RS232C interface of the unit
1	ProjM	AS-i master is in the projection mode
2	SI0	one slave with the address 0 was detected
3	APF	AS-i voltage is too low
4	PF	periphery fault
5	Offl:	AS-i master is offline (no AS-i slave detected)
6	Cerr	configuration error
7	CTRL	PLC in the device is in the RUN mode
8...15	-	reserved

Details configuration errors, periphery faults (LPF), LPS

10692

Configuration errors:	"1" at the corresponding position of an AS-i slave means: this slave has caused a configuration error
Periphery fault (LPF):	"1" at the corresponding position of an AS-i slave means: this slave has caused a periphery fault
List of projected slaves (LPS):	"1" at the corresponding position of an AS-i slave means: this slave is projected

→ following tables

List of the configuration errors on AS-i master 1

10694

Word no.	Bit (AS-i slave address)															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	0
2	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
3	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
4	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

List of periphery faults (LPF) on AS-i master 1

10695

Word no.	Bit (AS-i slave address)															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
5	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	---
6	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
7	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
8	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

List of projected slaves (LPS) on AS-i master 1

10693

Word no.	Bit (AS-i slave address)															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
9	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	---
10	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
11	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
12	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

List of the configuration errors on AS-i master 2

10697

Word no.	Bit (AS-i slave address)															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
13	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	0
14	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
15	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
16	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

List of periphery faults (LPF) on AS-i master 2

10698

Word no.	Bit (AS-i slave address)															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
17	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	---
18	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
19	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
20	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

List of projected slaves (LPS) on AS-i master 2

10696

Word no.	Bit (AS-i slave address)															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
21	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	---
22	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
23	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
24	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

5.3.21 Module 19 – host command channel

10701

Data content

10702

Host command channel data of the AS-i masters 1 + 2

Details → chapter The host command channel (→ page 126)

Direction of data

10703

C ⇔ F	Bidirectional (5/18 words in both directions) → Module settings

Module settings

10704

Value range = 0...2

0	module is deactivated
1	module is activated 5 words of command channel data
2	module is activated 18 words of command channel data

Data interpretation

10705

The host command channel gives the user the opportunity to read different data from the controller or to access defined functions of the controller.

The following table provides an overview of the available commands.

Commands in the host command channel

10706

Details + examples → chapter The host command channel (→ page 126)

Command no.	Description
0	execute no command
1	write parameters to a connected AS-i slave
3	adopt and save currently connected AS-i slaves in the configuration
4	change the list of projected AS-i slaves (LPS)
5	set the operating mode of the AS-i master
6	readdress a connected AS-i slave
7	set the auto addressing mode of the AS-i master
9	change the extended ID code 1 in the connected AS-i slave
10…20	adopt and save currently connected AS-i slaves in the configuration
28	deactivate the slave reset when changing to the protected mode
31	one-time execution of the "Extended safety monitor protocol" in the "Safety at work" monitor
21	read ID string of an AS-i slave with profile S-7.4
33	read diagnosis string of an AS-i slave with profile S-7.4
34	read parameter string of an AS-i slave with profile S-7.4
35	write parameter string of an AS-i slave with profile S-7.4
50	read current configuration AS-i slaves 0(A)...15(A)
51	read current configuration AS-i slaves 16(A)...31(A)
52	read current configuration AS-i slaves 0...15B
53	read current configuration AS-i slaves 16B...31B
54	read current parameters of a connected AS-i slave
55	read current AS-i slave lists
56	read projected configuration AS-i slaves 1(A)...15(A)
57	read projected configuration AS-i slaves 16(A)..31(A)
58	read projected configuration AS-i slaves 1B...15B
59	read projected configuration AS-i slaves 16B...31B
96	save data non-volatilely in the flash memory of the unit
97	carry out various settings in the device
102	retrieve the status of the device display
105	read the device properties

6 The fieldbus command channel (module 11)

Contents

4484

→ chapter Module 11 – fieldbus data command channel (→ page 61)

6.1 Module 11, command 1 – read master flags

4487

6.1.1 Request from fieldbus to device

10727

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		0	0					0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2

6.1.2 Response from device to fieldbus

10728

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	MF2								MF1								copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
MF1, MF2	master flags	1 byte	→ table Master flags in module 11 (→ page 92)

6.1.3 Master flags in module 11

4731

Byte	Bit	If E=0 & B=0, then:
MF1	0	periphery of all connected slaves is ok (no periphery fault)
	1	automatic addressing is enabled
	2	exchange of data with the slaves is active
	3...7	reserved
MF2	0	AS-i configuration is ok
	1	a slave 0 is detected
	2	automatic addressing is enabled
	3	automatic addressing is active
	4	configuration mode is active
	5	normal mode is active
	6	AS-i voltage fault has occurred
	7	offline phase completed

6.2 Module 11, command 2 – change operating mode

4488

6.2.1 Request from fieldbus to device

10730

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used								Mod								MM		0		0				0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
Mod	preset operating mode	1 byte	00 = protected mode 01 = projection mode

6.2.2 Response from device to fieldbus

10731

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used								copy of the request								copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.3 Module 11, command 3 – read current slave configuration

4489

6.3.1 Request from fieldbus to device

10733

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM	ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.3.2 Response from device to fieldbus

10734

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	ID code				IO configuration				extended ID code 2				extended ID code 1				copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.3.3 Example: Read current slave configuration of slave 7B on AS-i master 1

4741

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	6703	(slave no. **7**) + (master no. **1 * 64**) + (**32**, if B slave) = 103_{dec} = **67**$_{hex}$ 03 = command 3
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	6703	copy of the request command processed, no error occurred
2	03EF	0 = ID code 3 = IO configuration E = extended ID code 2 F = extended ID code 1

(corresponds to slave profile S 3.0.E = 2I/2O module with peripheral fault detection)

6.4 Module 11, command 4 – read projected slave configuration

4490

6.4.1 Request from fieldbus to device

10733

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM	ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.4.2 Response from device to fieldbus

10734

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	ID code				IO configuration				extended ID code 2				extended ID code 1				copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.4.3 Example: read projected slave configuration of slave 16(A) on AS-i master 1

4745

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	5004	(slave no. **16**) + (master no. **1 * 64**) + (32, if B slave) = 80_{dec} = **50_{hex}** 04 = command 4
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	5004	copy of the request command processed, no error occurred
2	37EF	3 = ID code 7 = IO configuration E = extended ID code 2 F = extended ID code 1

(corresponds to slave profile S 7.3.E = analogue input module with 4 inputs)

6.5 Module 11, command 5 – change projected slave configuration

4491

Requirement: the addressed AS-i master must be in the projection mode.
→ Module 11, command 2 – change operating mode (→ page 93)

6.5.1 Request from fieldbus to device

10736

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	ID code				IO configuration				extended ID code 2				extended ID code 1				MM		ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.5.2 Response from device to fieldbus

10738

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	copy of the request								copy of the request								copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.5.3 Possible command error codes

10784

Value [hex]	Meaning
17	master is not in the projection mode

6.5.4 Example: change projected slave configuration of slave 1(A) on master 2

4749

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	8105	(slave no. **1**) + (master no. **2 * 64**) + (32, if B slave) = 129_{dec} = **81**$_{hex}$ 05 = command 5
2	376F	3 = ID code 7 = IO configuration 6 = extended ID code 2 F = extended ID code 1

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	8105	copy of the request command processed, no error occurred
2	376F	copy of the request

6.6 Module 11, command 6 – read slave parameters

4492

6.6.1 Request from fieldbus to device

10733

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		ST	SLA					0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.6.2 Reply from AS-i master to fieldbus

10740

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	current parameter								projected parameter								copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.6.3 Example: read slave parameters of slave 2(A) on AS-i master 1

4753

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	4206	(slave no. **2**) + (master no. **1 * 64**) + (32, if B slave) = 66_{dec} = **42**$_{hex}$ 06 = command 6
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	4206	copy of the request command processed, no error occurred
2	0F03	0F = current parameter 03 = projected parameter

6.7 Module 11, command 7 – change projected slave parameters

4493

Info

The projected parameters can only be changed if the AS-i master operates in the projected mode.
Activation → chapter Module 11, command 2 – change operating mode (→ page 93)

6.7.1 Request from fieldbus to device

10742

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used								set parameter value								MM		ST	SLA					0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.7.2 Response from device to fieldbus

10731

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used								copy of the request								copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.7.3 Example: change projected slave parameters of slave 7B on AS-i master 1

4757

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	8707	(slave no. **7**) + (master no. **1 * 64**) + (**32**, if B slave) = 135_{dec} = **87**$_{hex}$ 07 = command 7
2	000F	00 = not used 0F = projected parameter

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	8707	copy of the request command processed, no error occurred
2	000F	copy of the request

6.8 Module 11, command 8 – read LAS (list of active slaves)

4494

6.8.1 Slave group in module 11

4759

The feedback word can only give information about max. 16 slaves. Therefore the slaves are divided in 4 groups (→ table).

When querying the slave lists any slave address from the requested slave group is to be indicated.

Slave group	Bit / AS-i slave address															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	0 *)
2	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
3	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
4	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

*) LAS and LPS have no slave 0, therefore this bit is set to 0!

6.8.2 Request from fieldbus to device

10733

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.8.3 Response from device to fieldbus

10744

DW	Data content																														
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	Addresses of the active slaves in this Slave group in module 11 (→ page 104)																copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.8.4 Example: read LAS (list of active slaves) of slave group 1 on master 1

5100

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	4208	(slave no. **2**) → slave group 1 + (master no. **1 * 64**) + (32, if B slave) = 66_{dec} = $\mathbf{42}_{hex}$ 08 = command 8
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	4208	copy of the request command processed, no error occurred
2	C602	$C6_{hex}$ = 11000110_{bin} → table Slave group in module 11 (→ page 104), slave group 1 ⇒ slaves 1(A), 2(A), 6(A) and 7(A) are active 02_{hex} = 00000010_{bin} → table Slave group in module 11 (→ page 104), slave group 1 ⇒ slave 9(A) is active

6.9 Module 11, command 9 – read LDS (list of detected slaves)

4495

The feedback word can only give information about max. 16 slaves. Therefore the slaves are divided in 4 groups (→ table Slave group in module 11 (→ page 104)).

6.9.1 Request from fieldbus to device

10733

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM	ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.9.2 Response from device to fieldbus

10746

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	Addresses of the detected slaves in this Slave group in module 11 (→ page 104)																copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.9.3 Example: read LDS (list of detected slaves) of slave group 3 on AS-i master 2

5106

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	A509	(slave no. **5**) → slave group 3 + (master no. **2 * 64**) + (**32**, if B slave) = 165_{dec} = **A5**$_{hex}$ 09 = command 9
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	A509	copy of the request command processed, no error occurred
2	C602	$C6_{hex}$ = 11000110_{bin} → table Slave group in module 11 (→ page 104), slave group 3 ⇒ slaves 1B, 2B, 6B and 7B were detected 02_{hex} = 00000010_{bin} → table Slave group in module 11 (→ page 104), slave group 3 ⇒ slave 9B is detected

6.10 Module 11, command 10dec (0Ahex) – read LPF (list of slaves with periphery fault)

4496

The feedback word can only give information about max. 16 slaves. Therefore the slaves are divided in 4 groups (→ table Slave group in module 11 (→ page 104)).

6.10.1 Request from fieldbus to device

10733

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.10.2 Response from device to fieldbus

10748

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	Addresses of the slaves with peripheral fault in this slave group in module 11																copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.10.3 Example: read LPF (list of slaves with periphery fault) of slave group 2 on AS-i master 1

5108

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	540A	(slave no. **20**) → slave group 2 + (master no. **1 * 64**) + (32, if B slave) = 84_{dec} = **54_{hex}** 0A = command 10
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	540A	copy of the request command processed, no error occurred
2	2002	20_{hex} = 00100000_{bin} → table Slave group in module 11 (→ page 104), slave group 2: ⇒ slave 21(A) indicates periphery fault 02_{hex} = 00000010_{bin} → table Slave group in module 11 (→ page 104), slave group 2: ⇒ slave 25(A) indicates periphery fault

6.11 Module 11, command 11dec (0Bhex) – read LPS (list of projected slaves)

4497

The feedback word can only give information about max. 16 slaves. Therefore the slaves are divided in 4 groups (→ table Slave group in module 11 (→ page 104)).

6.11.1 Request from fieldbus to device

10733

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM	ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	01_{bin} = 1_{dec} = master 1 10_{bin} = 2_{dec} = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex}$ = $0…31_{dec}$

6.11.2 Response from device to fieldbus

10750

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	Addresses of the projected slaves in this slave group in module 11																copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.11.3 Example: read LPS (list of projected slaves) of slave group 2 on AS-i master 1

5109

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	540B	(slave no. **20**) → slave group 2 + (master no. **1 * 64**) + (32, if B slave) = 84_{dec} = **54_{hex}** 0B = command 11
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	540B	copy of the request command number
2	FE02	FE_{hex} = 11111110_{bin} → table Slave group in module 11 (→ page 104), slave group 2: ⇒ slaves 17(A) to 23(A) are projected 02_{hex} = 00000010_{bin} → table Slave group in module 11 (→ page 104), slave group 2: ⇒ slave 25(A) is projected

6.12 Module 11, command 13dec (0Dhex) – read telegram error counter

4498

6.12.1 Request from fieldbus to device

10733

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.12.2 Response from device to fieldbus

10752

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	provides the number of errors during the exchange of data between the slave and the master since power on or reset																copy of the request									E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.12.3 Example: read telegram error counter of slave 1 on AS-i master 1

5110

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	410D	(slave no. **1**) + (master no. **1 * 64**) + (32, if B slave) = 65_{dec} = **41**$_{hex}$ 0D = command 13
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	410D	copy of the request command processed, no error occurred
2	0020	error counter = 0020_{hex} = 0032_{dec} ⇒ Since the last power on of the device or the reset of the counter, 32 faulty telegrams have occurred during data exchange.

6.13 Module 11, command 14dec (0Ehex) – read configuration error counter

4499

6.13.1 Request from fieldbus to device

10733

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		ST	SLA						0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.13.2 Response from device to fieldbus

10754

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	number of configuration errors of the master since power on or reset																copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.13.3 Example: read configuration error counter on AS-i master 2

5111

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	800E	(slave no. **1**) + (master no. **1 * 64**) + (32, if B slave) = 65_{dec} = **41**$_{hex}$ 0E = command 14
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	800E	copy of the request command processed, no error occurred
2	0003	error counter = 0003_{hex} = 0003_{dec} ⇒ Since the last power on of the device or the reset of the counter, 3 configuration errors have occurred.

6.14 Module 11, command 15dec (0Fhex) – read AS-i cycle counter

4500

6.14.1 Request from fieldbus to device

10727

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		0	0					0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2

6.14.2 Response from device to fieldbus

10756

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	number of AS-i cycles of the master since power on																copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.14.3 Example: read AS-i cycle counter of AS-i master 1

4787

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	400F	(master no. **1 * 64**) = 64_{dec} = **40_{hex}** 0F = command 15
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	400F	copy of the request command processed, no error occurred
2	04CA	cycle counter = $04CA_{hex}$ = 1 226_{dec} ⇒ Since the last power on of the device, 1 226 cycles have been performed in the AS-i master 1.

6.15 Module 11, command 16dec (10hex) – change current slave parameters

4501

6.15.1 Request from fieldbus to device

10742

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used								set parameter value								MM		ST	SLA					0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.15.2 Response from device to fieldbus

10758

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used								parameter feedback value (can be different from preset value)								copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.15.3 Example: change slave parameter of slave 7 on AS-i master 1 to the value [F]

4791

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	4710	(slave no. **7**) + (master no. **1 * 64**) + (32, if B slave) = 71_{dec} = **47**$_{hex}$ 10 = command 16
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	4710	copy of the request command processed, no error occurred
2	000F	0F = parameter feedback value (can be different from the preset value)

6.16 Module 11, command 19dec (13hex) – project all

4502

6.16.1 Request from fieldbus to device

10727

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		0	0					0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2

6.16.2 Response from device to fieldbus

10759

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used								status								copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
status	status	1 byte	80_{hex} = process completed 00 = in all other cases

6.16.3 Example: project all on AS-i master 1

4796

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	4013	(master no. **1 * 64**) = 64_{dec} = **40_{hex}** 13 = command 19
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	4013	copy of the request command processed, no error occurred
2	0080	80_{hex} = status: process completed

6.17 Module 11, command 21dec (15hex) – save configuration in flash

4503

6.17.1 Request from fieldbus to device

10727

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		0	0					0	0	command number					

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2

6.17.2 Response from device to fieldbus

10762

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																copy of the request								E	B	reflected command number					

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.17.3 Example: save AS-i configuration in flash for AS-i master 1

4800

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	4015	(master no. **1 * 64**) = 64_{dec} = **40_{hex}** 15 = command 21
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	4015	copy of the request command processed, no error occurred
2	0080	80_{hex} = status: process completed

6.18 Module 11, command 22dec (16hex) – reset telegram error counter of a slave

4504

6.18.1 Request from fieldbus to device

10733

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																MM		ST	SLA							0	0	command number			

Legend:

MM	master no.	2 bits	$01_{bin} = 1_{dec}$ = master 1 $10_{bin} = 2_{dec}$ = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

6.18.2 Response from device to fieldbus

10762

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																copy of the request										E	B	reflected command number			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

6.18.3 Example: reset telegram error counter of slave 7(A) on AS-i master 2

4804

Request from fieldbus master to device

Word no.	Value [hex.]	Meaning
1	8716	(slave no. **7**) + (master no. **2 * 64**) + (32, if B slave) = 135_{dec} = **87**$_{hex}$ 16 = command 22
2	0000	not used

Response from device to fieldbus master

Word no.	Value [hex.]	Meaning
1	8716	copy of the request command processed, no error occurred
2	0000	not used

7 The host command channel

10765

The module 19 (→ chapter Module 19 – host command channel (→ page 88)) contains an extended command channel which can have a length of 5 or 18 words. A PLC with DeviceNet interface can be used as host system. The commands are always triggered by the host by a corresponding entry in its output data range. The AS-i master responds then in the input data area of the host system.

7.1 Syntax of the host command channel

4507

7.1.1 Request from host to device

10767

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	res.		ST	SLA					0	0	number of data bytes to be transmitted						r.	S	M	UID					command number							
2...9	parameter data of the command to be executed																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)
S	sequence bit	1 bit	a large data packet is transmitted in several partial sequences: 0 = data transmission completed 1 = data transmission not yet completed, at least one more packet follows
SLA	slave address	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20$_{hex}$ or 32$_{dec}$ to the slave address)

2nd word: reserved for 7.4 commands
3...18th word: command data

NOTE

- If a command is to be executed, the user ID must be changed!
  Changing the command number alone does not start the execution.
- If a command is to be executed several times, the user ID must be changed accordingly, e.g. by counting up.
- Do not count up the user ID until the preceding command has been completed
  (to do so, check the bits E + B in the 1st word of the response).

7.1.2 Response from device to host

10768

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	r.	ST	reflected slave address					F	res.=0	number of received data bytes							E	B	M	reflected user ID							reflected command number				
2...9	command data																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
F	error bit	1 bit	0 = no error detected 1 = error when executing the command

2nd word: reserved for 7.4 commands
3...18th word: command data

7.2 Commands in the host command channel

Contents

4508

7.2.1 Commands in the host command channel

10706

Details + examples → chapter The host command channel (→ page 126)

Command no.	Description
0	execute no command
1	write parameters to a connected AS-i slave
3	adopt and save currently connected AS-i slaves in the configuration
4	change the list of projected AS-i slaves (LPS)
5	set the operating mode of the AS-i master
6	readdress a connected AS-i slave
7	set the auto addressing mode of the AS-i master
9	change the extended ID code 1 in the connected AS-i slave
10…20	adopt and save currently connected AS-i slaves in the configuration
28	deactivate the slave reset when changing to the protected mode
31	one-time execution of the "Extended safety monitor protocol" in the "Safety at work" monitor
21	read ID string of an AS-i slave with profile S-7.4
33	read diagnosis string of an AS-i slave with profile S-7.4
34	read parameter string of an AS-i slave with profile S-7.4
35	write parameter string of an AS-i slave with profile S-7.4
50	read current configuration AS-i slaves 0(A)...15(A)
51	read current configuration AS-i slaves 16(A)...31(A)
52	read current configuration AS-i slaves 0...15B
53	read current configuration AS-i slaves 16B...31B
54	read current parameters of a connected AS-i slave
55	read current AS-i slave lists
56	read projected configuration AS-i slaves 1(A)...15(A)
57	read projected configuration AS-i slaves 16(A)..31(A)
58	read projected configuration AS-i slaves 1B...15B
59	read projected configuration AS-i slaves 16B...31B
96	save data non-volatilely in the flash memory of the unit
97	carry out various settings in the device
102	retrieve the status of the device display
105	read the device properties

7.2.2 Error codes for host commands (summary)

10777

Here you will find general error messages.

Value [hex]	Meaning
01	no slave response OR: master is in the offline mode when requesting the command
02	no slave with the old address found
03	slave with address 0 connected
04	slave with the new address already exists
05	error when deleting the old address
06	error when reading the IO configuration
07	error when writing the new address or extended ID code 1
08	new address could only be saved temporarily
09	extended ID code 1 could only be saved temporarily
0A	the slave is not in the LAS
0B	parameter or address invalid
14	master is in the wrong operating mode *)
17	master is not in the projection mode

7.2.3 Error codes for host commands for safety slaves

10779

Value [hex]	Meaning
00…02	general errors during command processing
0A…0C	internal protocol error
10	sub command invalid
11	no slave with the profile S-7.F.F on the slave address
16	the monitor with the address was changed in the protocol mode
20	command could not be processed within the specified time
EE	fatal error during command execution

7.2.4 Error codes for host commands for slaves profile S-7.4

10780

Value [hex]	Meaning
0C	faulty S-7.4 protocol sequence
0D	S-7.4 protocol aborted (timeout)
0E	invalid AS-i slave address for the S-7.4 protocol (e.g. B slaves)
0F	AS-i slave has aborted the S-7.4 string
10	AS-i S-7.4 no longer connected (no longer in LAS)
11	another S-7.4 transfer to the addressed AS-i slave is already active
12	the previous segmented S-7.4 transfer was not yet completed
13	invalid S-7.4 data length
14	invalid S-7.4 command

7.2.5 Module 19, command 00dec (00hex) – no execution of a command

4509

Request from host to device

10771

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)

Response from device to host

10772

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																E	B	M	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Example: no execution of a command

4815

Request from host to device

Word no.	Value [hex.]	Meaning
1	0300	M=0: AS-i master 1 UID=03: user ID changes to 3 00 = command 0
2…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0300	copy of the request command processed, no error occurred
2…18	0000	not changed

7.2.6 Module 19, command 01dec (01hex) – write parameters to an AS-i slave (change current slave parameters)

4510

Requirement: The addressed AS-i master must be in the normal mode.

Request from host to device

10774

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		M	UID					command number							
2	reserved = 0								parameter value to be written								reserved = 0								res.		ST	SLA				
3...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	00…$1F_{hex}$ = 0…31_{dec}

Response from device to host in the normal case

10775

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								read back parameter value							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Response from device to host in case of a fault

10776

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								error code							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Possible command error codes

10783

Value [hex]	Meaning
01	no slave response OR: master is in the offline mode when requesting the command
0A	the slave is not in the LAS
0B	parameter or address invalid
14	master is in the wrong operating mode *)

*) here: is not in the protected mode

Example: change parameter of slave 4B on AS-i master 1 to the value 03

4825

Request from host to device

Word no.	Value [hex.]	Meaning
1	0901	M=0: AS-i master 1 UID=09: user ID changes to 9 01 = command 1
2	0000	reserved
3	0024	(slave no. **4**) + (**32**, if B slave) = 36_{dec} = $\mathbf{24}_{hex}$
4	0003	parameter value to be written
5…18	0000	not used

Response from device to host in the normal case

Word no.	Value [hex.]	Meaning
1	0901	copy of the request command processed, no error occurred
2	0000	reserved
3	0003	parameter value read back; may differ from the value to be written (so-called reflected parameter)
4…18	0000	not changed

Response from device to host in case of a fault

Word no.	Value [hex.]	Meaning
1	8901	copy of the request E=1: error when executing the command
2	0000	reserved
3	000A	error code=0A: slave is not in LAS
4…18	0000	not changed

7.2.7 Module 19, command 03dec (03hex) – adopt and save currently connected AS-i slaves in the configuration

4511

Requirement: The addressed AS-i master must be in the projection mode.

Request from host to device

10771

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)

Response from device to host in the normal case

10782

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																D	B	M	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Response from device to host in case of a fault

10776

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								error code							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Possible command error codes

10784

Value [hex.]	Meaning
14	master is in the wrong operating mode *)

*) here: is not in the protected mode

Example: adopt and save currently connected AS-i slaves in the configuration

4830

Request from host to device

Word no.	Value [hex.]	Meaning
1	0C03	M=0: AS-i master 1 UID=0C: user ID changes to 12 03 = command 3
2…18	0000	not used

Response from device to host in the normal case

Word no.	Value [hex.]	Meaning
1	0C03	copy of the request command processed, no error occurred
2…18	0000	not changed

Response from device to host in case of a fault

Word no.	Value [hex.]	Meaning
1	8C03	copy of the request E=1: error when executing the command
2	0000	reserved
3	0017	error code=17: master is not in the projection mode
4…18	0000	not changed

7.2.8 Module 19, command 04dec (04hex) – change the list of projected AS-i slaves (LPS)

4512

Requirement: The addressed AS-i master must be in the projection mode.

Request from host to device

10786

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		M	UID					command number							
2	slave group 2																slave group 1															
3	slave group 4																slave group 3															
4...9	not used																															

► For each slave to be projected:
Set the bit corresponding to the slave address to TRUE in the double words 2...3
(→ following table of the slave groups).

Slave group	Bit / AS-i slave address															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	0 *)
2	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
3	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
4	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)

Response from device to host in the normal case

10782

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																D	B	M	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Response from device to host in case of a fault

10776

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								error code							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Possible command error codes

10788

Value [hex]	Meaning
14	master is in the wrong operating mode *)

*) here: is not in the protected mode

Example: adopt and save currently connected AS-i slaves in the configuration

4835

Request from host to device

Word no.	Value [hex.]	Meaning
1	0204	M=0: AS-i master 1 UID=02: user ID changes to 2 04 = command 4
2	0000	reserved
3	003E	slaves 1 to 5 are to be projected
4	8000	slave 31A is to be projected
5	0002	slave 1B is to be projected
6	0001	slave 16B is to be projected
7…18	0000	not used

Response from device to host in the normal case

Word no.	Value [hex.]	Meaning
1	0204	copy of the request command processed, no error occurred
2…18	0000	not changed

Response from device to host in case of a fault

Word no.	Value [hex.]	Meaning
1	8204	copy of the request E=1: error when executing the command
2	0000	reserved
3	0014	error code=14: master is not in the projection mode
4…18	0000	not changed

7.2.9 Module 19, command 05dec (05hex) – set the operating mode of the AS-i master

4513

Request from host to device

10790

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		M	UID					command number							
2	not used																reserved = 0								MOD							
3...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)
MOD	operating mode	1 byte	00 = set master to the normal mode (protected mode) 01 = set master to the projection mode

Response from device to host in the normal case

10782

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																D	B	M	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Response from device to host in case of a fault

10776

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								error code							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Possible command error codes

10791

Value [hex]	Meaning
03	slave with address 0 connected

Example: set AS-i master 1 to projection mode

4842

Request from host to device

Word no.	Value [hex.]	Meaning
1	0105	M=0: AS-i master 1 UID=01: user ID changes to 1 05 = command 5
2	0000	reserved
3	0001	1 = set master to the projection mode
4…18	0000	not used

Response from device to host in the normal case

Word no.	Value [hex.]	Meaning
1	0105	copy of the request command processed, no error occurred
2…18	0000	not changed

Response from device to host in case of a fault

Word no.	Value [hex.]	Meaning
1	8105	copy of the request E=1: error when executing the command
2	0000	reserved
3	0003	error code=03: one slave with the address 0 is connected
4…18	0000	not changed

7.2.10 Module 19, command 06dec (06hex) – readdress a connected AS-i slave

4514

Request from host to device

107936

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		M	UID					command number							
2	reserved = 0								res.		ST	new SLA					reserved = 0								res.		ST	old SLA				
3...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20$_{hex}$ or 32$_{dec}$ to the slave address)
SLA	slave address	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$

Response from device to host in the normal case

10782

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																D	B	M	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Response from device to host in case of a fault

10776

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								error code							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Possible command error codes

10794

Value [hex]	Meaning
01	no slave response OR: master is in the offline mode when requesting the command
02	no slave with the old address found
03	slave with address 0 connected
04	slave with the new address already exists
05	error when deleting the old address
06	error when reading the IO configuration
07	error when writing the new address or extended ID code 1
08	new address could only be saved temporarily
09	extended ID code 1 could only be saved temporarily
0B	parameter or address invalid
14	master is in the wrong operating mode *)

*) here: is not in the protected mode

Example: readdress AS-i slave 9B to 11A

4854

Request from host to device

Word no.	Value [hex.]	Meaning
1	0806	M=0: AS-i master 1 UID=08: user ID changes to 8 06 = command 6
2	0000	reserved
3	0029	29 = 20_{hex} (for B slaves) + 9_{hex} = old slave address 9B
4	000B	B_{hex} = 11_{dec} = new slave adress 11A
5…18	0000	not used

Response from device to host in the normal case

Word no.	Value [hex.]	Meaning
1	0806	copy of the request command processed, no error occurred
2…18	0000	not changed

Response from device to host in case of a fault

Word no.	Value [hex.]	Meaning
1	8806	copy of the request E=1: error when executing the command
2	0000	reserved
3	0003	error code=03: one slave with the address 0 is connected
4…18	0000	not changed

7.2.11 Module 19, command 07dec (07hex) – set the auto address mode of the AS-i master

4515

Request from host to device

10796

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		M	UID					command number							
2	not used																reserved = 0								AutoAd							
3...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)
AutoAd	automatic addressing	1 byte	00 = deactivate automatic addressing 01 = activate automatic addressing

Response from device to host

10772

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																E	B	M	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Example: activate automatic addressing AS-i master 1

4859

Request from host to device

Word no.	Value [hex.]	Meaning
1	0407	M=0: AS-i master 1 UID=04: user ID changes to 4 07 = command 7
2	0000	reserved
3	0001	01 = activate automatic addressing
4…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0407	copy of the request command processed, no error occurred
2…18	0000	not changed

7.2.12 Module 19, command 09dec (09hex) – change extended ID code 1 in the AS-i slave

4516

Request from host to device

10798

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		M	UID					command number							
2	reserved = 0								New "extended ID code 1"								reserved = 0								res.		ST	SLA				
3...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20$_{hex}$ or 32$_{dec}$ to the slave address)
SLA	slave address	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$

Response from device to host in the normal case

10782

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																D	B	M	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Response from device to host in case of a fault

10776

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								error code							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Possible command error codes

10799

Value [hex]	Meaning
01	no slave response OR: master is in the offline mode when requesting the command
02	no slave with the old address found
03	slave with address 0 connected
07	error when writing the new address or extended ID code 1
09	extended ID code 1 could only be saved temporarily
0B	parameter or address invalid

Example: change [extended ID code 1] in AS-i slave 17(A) to [8]

4864

Request from host to device

Word no.	Value [hex.]	Meaning
1	0F09	M=0: AS-i master 1 UID=0F: user ID changes to 15 09 = command 9
2	0000	reserved
3	0011	$11_{hex} = 17_{dec}$ = slave address 17(A)
4	0008	new "Extended ID Code 1" is 8
5…18	0000	not used

Response from device to host in the normal case

Word no.	Value [hex.]	Meaning
1	0F09	copy of the request command processed, no error occurred
2…18	0000	not changed

Response from device to host in case of a fault

Word no.	Value [hex.]	Meaning
1	8F09	copy of the request E=1: error when executing the command
2	0000	reserved
3	0007	error code=17: slave does not support extended ID code
4…18	0000	not changed

7.2.13 Module 19, commands 10...20dec (0A...14hex) – force analogue data transmission directly to / from 3 AS-i slaves each

4517

With these commands, the analogue input or output data of 3 slaves can be overwritten. The commands are assigned to 3 slave addresses:

Command number		Slave addresses		
decimal	hexadecimal			
10	**0A**	1	2	3
11	**0B**	4	5	6
12	**0C**	7	8	9
13	**0D**	10	11	12
14	**0E**	13	14	15
15	**0F**	16	17	18
16	**10**	19	20	21
17	**11**	22	23	24
18	**12**	25	26	27
19	**13**	28	29	30
20	**14**	31	-	-

Table: Assignment command number - slave addresses

Example: In the command 14_{dec} ($0E_{hex}$) the data of the slave addresses 13, 14 and 15 are transmitted.

Request from host to device

10801

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.	M	UID						command number							
2	output data AS-i slave 1/4/7/10/13/16/19/22/25/28/31, channel 1																output data AS-i slave 1/4/7/10/13/16/19/22/25/28/31, channel 0															
3	output data AS-i slave 1/4/7/10/13/16/19/22/25/28/31, channel 3																output data AS-i slave 1/4/7/10/13/16/19/22/25/28/31, channel 2															
4	output data AS-i slave 2/5/8/11/14/17/20/23/26/29, channel 0																reserved = 0								O3	V3	O2	V2	O1	V1	O0	V0
5	output data AS-i slave 2/5/8/11/14/17/20/23/26/29, channel 2																output data AS-i slave 2/5/8/11/14/17/20/23/26/29, channel 1															
6	reserved = 0								O3	V3	O2	V2	O1	V1	O0	V0	output data AS-i slave 2/5/8/11/14/17/20/23/26/29, channel 3															
7	output data AS-i slave 3/6/9/12/15/18/21/24/27/30, channel 1																output data AS-i slave 3/6/9/12/15/18/21/24/27/30, channel 0															
8	output data AS-i slave 3/6/9/12/15/18/21/24/27/30, channel 3																output data AS-i slave 3/6/9/12/15/18/21/24/27/30, channel 2															
9	not used																reserved = 0								O3	V3	O2	V2	O1	V1	O0	V0

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)
Vn	valid bit	1 bit	0 = values in channel n are invalid 1 = values in channel n are valid Output data must be valid (Vn = 1) to be enabled in the AS-i slave!
On	overflow bit	1 bit	0 = data is in the valid range 1 = data is in the invalid range (especially in case of input modules when the measuring range is not reached or exceeded)

Response from device to host

10802

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved																E	B	M	reflected user ID					reflected command number						
2	input data or reflected output data AS-i slave 1/4/7/10/13/16/19/22/25/28/31, channel 1																input data or reflected output data AS-i slave 1/4/7/10/13/16/19/22/25/28/31, channel 0															
3	input data or reflected output data AS-i slave 1/4/7/10/13/16/19/22/25/28/31, channel 3																input data or reflected output data AS-i slave 1/4/7/10/13/16/19/22/25/28/31, channel 2															
4	input data or reflected output data AS-i slave 2/5/8/11/14/17/20/23/26/29, channel 0																reserved = 0						TV	OV	O3	V3	O2	V2	O1	V1	O0	V0
5	input data or reflected output data AS-i slave 2/5/8/11/14/17/20/23/26/29, channel 2																input data or reflected output data AS-i slave 2/5/8/11/14/17/20/23/26/29, channel 1															
6	reserved = 0						TV	OV	O3	V3	O2	V2	O1	V1	O0	V0	input data or reflected output data AS-i slave 2/5/8/11/14/17/20/23/26/29, channel 3															
7	input data or reflected output data AS-i slave 3/6/9/12/15/18/21/24/27/30, channel 1																input data or reflected output data AS-i slave 3/6/9/12/15/18/21/24/27/30, channel 0															
8	input data or reflected output data AS-i slave 3/6/9/12/15/18/21/24/27/30, channel 3																input data or reflected output data AS-i slave 3/6/9/12/15/18/21/24/27/30, channel 2															
9	not changed																reserved = 0						TV	OV	O3	V3	O2	V2	O1	V1	O0	V0

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2
OV	output valid	1 bit	0 = the AS-i slave has not received any valid output values for at least 3.5 seconds OR: it is an input slave 1 = AS-i slave has received valid data at least once in the last 3 seconds
TV	transfer valid	1 bit	0 = the last value transfer to the AS-i slave was faulty 1 = the last value transfer to the AS-i slave was carried out correctly Since "TV" evaluates the data transfer cycle which was last completed, the response is delayed by up to 140 ms.
On	overflow bit	1 bit	0 = data is in the valid range 1 = data is in the invalid range (especially in case of input modules when the measuring range is not reached or exceeded)
Vn	valid bit	1 bit	0 = values in channel n are invalid 1 = values in channel n are valid Output data must be valid (Vn = 1) to be enabled in the AS-i slave!

Example: force analogue data (4 channels) to slave 1 on master 1

4873

Request from host to device

Word no.	Value [hex.]	Meaning
1	090A	M=0: AS-i master 1 UID=09: user ID changes to 9 0A = command 10
2	0000	reserved
3	0169	output data AS-i slave 1, channel 0
4	0202	output data AS-i slave 1, channel 1
5	0395	output data AS-i slave 1, channel 2
6	1033	output data AS-i slave 1, channel 3
7	0055	**o**verflow and **v**alid bits for AS-i slave 1: O3 = 0, V3 = 1, O2 = 0, V2 = 1, O1 = 0, V1 = 1, O0 = 0, V0 = 1
8	2009	output data AS-i slave 2, channel 0
9	2202	output data AS-i slave 2, channel 1
10	0195	output data AS-i slave 2, channel 2
11	1022	output data AS-i slave 2, channel 3
12	0055	**o**verflow and **v**alid bits for AS-i slave 2: O3 = 0, V3 = 1, O2 = 0, V2 = 1, O1 = 0, V1 = 1, O0 = 0, V0 = 1
13	3339	output data AS-i slave 3, channel 0
14	1102	output data AS-i slave 3, channel 1
15	1953	output data AS-i slave 3, channel 2
16	1234	output data AS-i slave 3, channel 3
17	0055	**o**verflow and **v**alid bits for AS-i slave 3: O3 = 0, V3 = 1, O2 = 0, V2 = 1, O1 = 0, V1 = 1, O0 = 0, V0 = 1
18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	090A	copy of the request command processed, no error occurred
2	0000	reserved
3	3169	(slave 1 is a 4-channel input slave) input data AS-i slave 1, channel 0
4	2202	input data AS-i slave 1, channel 1
5	1395	input data AS-i slave 1, channel 2
6	0033	input data AS-i slave 1, channel 3
7	0055	**o**verflow and **v**alid bits for AS-i slave 1: TV = 1, OV = 0, O3 = 0, V3 = 1, O2 = 0, V2 = 1, O1 = 0, V1 = 1, O0 = 0, V0 = 1
8	2229	(slave 2 is a 2-channel input slave) input data AS-i slave 2, channel 0
9	2332	input data AS-i slave 2, channel 1
10	7FFF	for AS-i slave 2, channel 2 no valid value
11	7FFF	for AS-i slave 2, channel 3 no valid value
12	0055	**o**verflow and **v**alid bits for AS-i slave 2: TV = 1, OV = 0, O3 = 0, V3 = 1, O2 = 0, V2 = 1, O1 = 0, V1 = 1, O0 = 0, V0 = 1
13	3339	(slave 3 is a 4-channel output slave) output data AS-i slave 3, channel 0
14	1102	output data AS-i slave 3, channel 1
15	1953	output data AS-i slave 3, channel 2
16	1234	output data AS-i slave 3, channel 3
17	0055	**o**verflow and **v**alid bits for AS-i slave 3: TV = 1, OV = 1, O3 = 0, V3 = 1, O2 = 0, V2 = 1, O1 = 0, V1 = 1, O0 = 0, V0 = 1
18	0000	not used

Since this flag "TV" evaluates the data transfer cycle which was last completed the response is delayed by up to 140 ms.

7.2.14 Module 19, command 21dec (15hex) – read the ID string of an AS-i slave with the profile S-7.4

4518

Request from host to device

10814

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	res.		ST	SLA					res.				DL				res.		M	UID					command number							
3...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	$00…1F_{hex} = 0…31_{dec}$ (a change to the user ID starts the command call)
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$
DL	data length	5 bits	$00…1F_{hex} = 0…31_{dec}$

Response from device to host in the normal case

10815

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	TG	ST	reflected slave address					F	res.		number of bytes to be received						E	B	M	reflected user ID								reflected command number			
2	number of parameters to be read								EDT Read		res.		Diag		res.		I/O	2D	DT start			DT count			Mux field			E type			
3	Device-specific information									manufacturer identification							EDT Write		reserved								number of parameters to be written				
4...8	Device-specific information																															
9	not changed								not changed								reserved								number of bytes received						

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
S	sequence bit	1 bit	a large data packet is transmitted in several partial sequences: 0 = data transmission completed 1 = data transmission not yet completed, at least one more packet follows
M	master no.	1 bit	0 = master 1 1 = master 2
TG	toggle bit	1 bit	value changes for each execution of the command
F	error bit	1 bit	0 = no error detected 1 = error when executing the command
DL	data length	5 bits	$00…1F_{hex} = 0…31_{dec}$
I/O	direction of data	1 bit	direction of data for the devices with E type ≠ 3 0 = input 1 = output
2D	double data transfer	1 bit	double data transfer (redundancy) possible 0 = simple data transfer 1 = double data transfer
DT-Start	start triple	3 bits	(information for the driver in the master)
DT-Count	number of data triples	3 bits	(information for the driver in the master)
Mux field	number of multiplexed data words	3 bits	0…3 number = value in "Mux field" +1
E type	slave function + data structure	5 bits	characterises the slave as regards functionality and data structure 00 = reserved 01 = transmitted values are measured values 02 = transmitted values are 16 digital bit values 03 = normal operation in 4-bit mode (4I/4O) $04...1F_{hex} = 04...31_{dec}$ = reserved
	number of parameter bytes to be read	1 byte	number of bytes which can be read as parameter string 00 = no parameter string readable $01...DB_{hex} = 01...219_{dec}$ = number of bytes
EDT read	reserved	3 bits	reserved for later profiles

Diag	slave supports the 7.4 diagnosis string	1 bit	0 = diagnosis string is not supported 1 = diagnosis string is supported
EDT write	reserved	3 bits	reserved for later profiles
	number of parameter bytes to be written	1 byte	number of bytes which can be written as parameter string 00 = no parameter string readable 01...DB_{hex} = 01...219_{dec} = number of bytes
	device-specific information	1 byte	as an option more bytes for the manufacturer-specific device description
	manufacturer identification	1 byte	defined manufacturer number assigned by AS-International

Response from device to host in case of a fault

10776

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								error code							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Possible command error codes

10816
10780

Value [hex]	Meaning
0C	faulty S-7.4 protocol sequence
0D	S-7.4 protocol aborted (timeout)
0E	invalid AS-i slave address for the S-7.4 protocol (e.g. B slaves)
0F	AS-i slave has aborted the S-7.4 string
10	AS-i S-7.4 no longer connected (no longer in LAS)
11	another S-7.4 transfer to the addressed AS-i slave is already active
12	the previous segmented S-7.4 transfer was not yet completed
13	invalid S-7.4 data length
14	invalid S-7.4 command

Example: read ID string of AS-i slave 3(A) on AS-i master 1

4901

Request from host to device

Word no.	Value [hex.]	Meaning
1	0215	M=0: AS-i master 1 UID=02: user ID changes to 2 15 = command 21
2	0300	$03_{hex} = 03_{dec}$ = slave address 3(A)
3…18	0000	not used

Response from device to host in the normal case

Word no.	Value [hex.]	Meaning
1	0215	copy of the request command processed, no error occurred
2	0608 8608	0xxx/8xxx = the toggle bit changes after each execution x6xx = slave address 3(A), shifted 1 bit to the left 08 ⇒ 8 data bytes ID strings have been received
3	2D01	1st word of the ID string of slave 3: $2D01_{hex}$ = 0010 1101 0000 0001_{bin}
4	0203	2nd word of the ID string of slave 3: 0203_{hex} = 0000 0010 0000 0011_{bin}
…	…	etc.
17	0008	08 = unit sends an ID string with 8 bytes length
18	0000	not changed

Response from device to host in case of a fault

Word no.	Value [hex.]	Meaning
1	8215	copy of the request E=1: error when executing the command
2	0000	reserved
3	0014	error code=14: invalid S-7.4 command / master not in the Protected mode
4…18	0000	not changed

7.2.15 Module 19, command 28dec (1Chex) – no slave reset when changing to the protected mode

4519

Normally, when changing from projection mode to protected mode, all slaves are briefly reset (reset or offline phase). This may lead to problems when the system is running. In such cases the "deactivation of the slave reset" prevents the short-term deactivation of the slave outputs during changing of the operating mode.

Request from host to device

10804

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		M	UID					command number							
2	not used																reserved = 0								OLP							
3...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)
OLP	offline phase = slave reset	1 byte	00 = offline phase when changing over to the protected mode 01 = no offline phase when changing over to the protected mode

Response from device to host

10772

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																E	B	M	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Example: master 1 – no slave reset when changing to the protected mode

4906

Request from host to device

Word no.	Value [hex.]	Meaning
1	041C	M=0: AS-i master 1 UID=04: user ID changes to 4 1C = command 28
2	0000	reserved
3	0001	01 = no offline phase when changing to the protected mode
4…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	041C	copy of the request command processed, no error occurred
2…18	0000	not changed

7.2.16 Module 19, command 31dec (1Fhex) – one-time execution of the extended safety monitor protocol in the Safety-at - Work monitor

4520

Request from host to device

10806

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		M	UID					command number							
2	not used																sub command								res.		0	SLA				
3...8	not used																not used															
9	not used																field number								data length							

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	$00…1F_{hex} = 0…31_{dec}$ (a change to the user ID starts the command call)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$

Response from device to host in the normal case

10807

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	LEDs OSSD 1				LEDs OSSD 2				data call 1				data call 0				reflected subcommand								reflected slave address						
3	1st colour output circuit 1								1st module address output circuit 1								OSSD2 not green								OSSD1 not green						
4	3rd colour output circuit 1								3rd module address output circuit 1								2nd colour output circuit 1								2nd module address output circuit 1						
5	5th colour output circuit 1								5th module address output circuit 1								4th colour output circuit 1								4th module address output circuit 1						
6	1st colour output circuit 2								1st module address output circuit 2								6th colour output circuit 1								6th module address output circuit 1						
7	3rd colour output circuit 2								3rd module address output circuit 2								2nd colour output circuit 2								2nd module address output circuit 2						
8	5th colour output circuit 2								5th module address output circuit 2								4th colour output circuit 2								4th module address output circuit 2						
9	field number								reserved = 0								6th colour output circuit 2								6th module address output circuit 2						

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Description of the fields [LEDs OSSD 1/2]

10808

Value [hex.]	Value [bin.]	Description
0	0000	green = contacts of the output circuits closed
1	0001	yellow = start-up / restart disable active
2	0010	yellow flashing or red: = contacts of the output circuits open
3	0011	red flashing = error on the level of the monitored AS-i components
> 4	> 0100	reserved

Description of the fields [Data call 1/2]

10809

Data call 1		Data call 0		Description
Value [hex.]	Value [bin.]	Value [hex.]	Value [bin.]	
8	1000	0	0000	protective operation, everything ok (also non-existent, non-configured or dependent output circuits are displayed as "ok")
9	1001	1	0001	protective operation, output circuit 1 off
A	1010	2	0010	protective operation, output circuit 2 off
B	1011	3	0011	protective operation, both output circuits off
C	1100	4	0100	configuration operation: power on
D	1101	5	0101	configuration operation
E	1110	6	0110	reserved / not defined
F	1111	7	0111	configuration operation: fatal device error, RESET or device exchange required
-	-	> 8	1xxx	no current diagnostic information available, please wait.

Description of the fields [OSSD1/2 not green]

10810

Value [hex.]	Value [bin.]	Description
0	0000	no modules, responses of the data calls in the words 6...17 are not relevant
1	0001	number of modules in the output circuit is 1
…	…	…
6	0110	number of modules in the output circuit is 6
7	0111	number of modules in the output circuit is > 6
> 8	1xxx	reserved / not defined

Description of the fields [Colour in the output circuit]

10811

Module address 1...6 in output circuit 1/2: Indicates the index of the module of the configuration. The module address which was defined in the ASIMON program is indicated.

Value [hex.]	Value [bin.]	Description
0	0000	green, permanently lit
1	0001	green, flashing
2	0010	yellow, permanently lit
3	0011	yellow, flashing
4	0100	red, permanently lit
5	0101	red, flashing
6	0110	grey, off

Response from device to host in case of a fault

10776

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved								reserved								E	B	M	reflected user ID					reflected command number							
2	not changed								not changed								reserved = 0								error code							
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Possible command error codes

10812
10779

Value [hex]	Meaning
00…02	general errors during command processing
0A…0C	internal protocol error
10	sub command invalid
11	no slave with the profile S-7.F.F on the slave address
16	the monitor with the address was changed in the protocol mode
20	command could not be processed within the specified time
EE	fatal error during command execution

Example: one-time execution of the extended safety monitor protocol on address 30

4922

Request from host to device

Word no.	Value [hex.]	Meaning
1	071F	M=0: AS-i master 1 UID=07: user ID changes to 7 1F = command 31
2	0000	reserved
3	001E	00 = sub command 0 = one-time execution of the extended safety monitor protocol $1E_{hex} = 30_{dec}$ = Safety-at-Work monitor with the slave address 30
4…18	0000	not used

Response from device to host in the normal case : Safety-at-Work monitor has not triggered

Word no.	Value [hex.]	Meaning
1	071F	copy of the request command processed, no error occurred
2	0000	reserved
3	001E	reflected command data
4	0000	green: contacts of the output circuits closed
5	0000	both output circuits green
6…17	xxxx	not relevant, because 5th word = 0000
18	0000	not changed

Response from device to host in the normal case : Safety-at-Work monitor has triggered

Word no.	Value [hex.]	Meaning
1	071F	copy of the request command processed, no error occurred
2	0000	reserved
3	001E	reflected command data
4	2211	2x = output circuit 1 red; x2 = invalid, → word 5; 11 = protective operation, output circuit 1 off
5	0003	00 = OSSD2 green 03 = OSSD1 not green, provides 3 modules which are not green
6	0421	04 = red permanently lit 21 = module 33
7	0422	04 = red permanently lit 22 = module 34
8	0423	04 = red permanently lit 23 = module 35
9…11	xxxx	not relevant, because low byte of 5th word = 03 ⇒ 3 modules relevant
12…17	xxxx	not relevant, because high byte of 5th word = 00 ⇒ green, no module relevant
18	0100	01 = field nubmer 1

Response from device to host in case of a fault

Word no.	Value [hex.]	Meaning
1	871F	copy of the request E=1: error when executing the command
2	0000	reserved
3	0011	error code=11: no slave with the profile S-7.F.F on the slave address
4…18	0000	not changed

7.2.17 Module 19, command 33dec (21hex) – read the diagnosis string of an AS-i slave with profile S-7.4

4521

Request from host to device

10818

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	res.		ST	SLA					res.		DL						r.	S	M	UID					command number							
3...9	not used																															

Legend:

S	sequence bit	1 bit	a large data packet is transmitted in several partial sequences: 0 = data transmission completed 1 = data transmission not yet completed, at least one more packet follows
M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	$00…1F_{hex} = 0…31_{dec}$ (a change to the user ID starts the command call)
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$
DL	data length	6 bits	number of bytes to be transferred permitted values: $01…20_{hex} = 01…32_{dec}$ (→ data sheet of the slave)

Response from device to host

10819

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	TG	ST	reflected slave address					F	res.		DL						E	S	M	reflected user ID								reflected command number			
2	diagnosis string 3								diagnosis string 2								diagnosis string 1								diagnosis string 0							
3	diagnosis string 7								diagnosis string 6								diagnosis string 5								diagnosis string 4							
4	diagnosis string 11								diagnosis string 10								diagnosis string 9								diagnosis string 8							
5	diagnosis string 15								diagnosis string 14								diagnosis string 13								diagnosis string 12							
6	diagnosis string 19								diagnosis string 18								diagnosis string 17								diagnosis string 16							
7	diagnosis string 23								diagnosis string 22								diagnosis string 21								diagnosis string 20							
8	diagnosis string 27								diagnosis string 26								diagnosis string 25								diagnosis string 24							
9	not changed																diagnosis string 29								diagnosis string 28							

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
S	sequence bit	1 bit	a large data packet is transmitted in several partial sequences: 0 = data transmission completed 1 = data transmission not yet completed, at least one more packet follows
M	master no.	1 bit	0 = master 1 1 = master 2
TG	toggle bit	1 bit	value changes for each execution of the command
F	error bit	1 bit	0 = no error detected 1 = error when executing the command
DL	data length	6 bits	number of bytes to be transferred permitted values: 01…20_{hex} = 01…32_{dec} (→ data sheet of the slave)

Info

The control bytes defined in profile 7.4 with follow and valid bits are filtered out by the system.

Example: read diagnosis string of AS-i slave 3(A) on AS-i master 1

4927

Request from host to device

Word no.	Value [hex.]	Meaning
1	0721	S=0: sequence here always 0 M=0: AS-i master 1 UID=07: user ID changes to 7 21 = command 33
2	0300	03_{hex} = 03_{dec} = slave address 3(A)
3…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0721	S=0: last sequence copy of the request command processed, no error occurred
2	0608 8608	0xxx/8xxx = the toggle bit changes after each execution x6xx = slave address 3(A), shifted 1 bit to the left 08 ⇒ 8 diagnosis strings received
3	2D01	01 = diagnosis string 0 of slave 3 2D = diagnosis string 1 of slave 3
4	0203	03 = diagnosis string 2 of slave 3 02 = diagnosis string 3 of slave 3
5	1122	22 = diagnosis string 4 of slave 3 11 = diagnosis string 5 of slave 3
6	3344	44 = diagnosis string 6 of slave 3 33 = diagnosis string 7 of slave 3
7…18	0000	not changed

7.2.18 Module 19, command 34dec (22hex) – read the parameter string of an AS-i slave with the profile S-7.4

4522

Request from host to device

10818

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	res.		ST	SLA					res.		DL						r.	S	M	UID					command number							
3...9	not used																															

Legend:

S	sequence bit	1 bit	a large data packet is transmitted in several partial sequences: 0 = data transmission completed 1 = data transmission not yet completed, at least one more packet follows
M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	$00…1F_{hex} = 0…31_{dec}$ (a change to the user ID starts the command call)
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$
DL	data length	6 bits	number of bytes to be transferred permitted values: $01…20_{hex} = 01…32_{dec}$ (→ data sheet of the slave)

Response from device to host

10821

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	TG	ST	reflected slave address					F	res.		DL						E	S	M	reflected user ID					reflected command number						
2	parameter string 3								parameter string 2								parameter string 1								parameter string 0						
3	parameter string 7								parameter string 6								parameter string 5								parameter string 4						
4	parameter string 11								parameter string 10								parameter string 9								parameter string 8						
5	parameter string 15								parameter string 14								parameter string 13								parameter string 12						
6	parameter string 19								parameter string 18								parameter string 17								parameter string 16						
7	parameter string 23								parameter string 22								parameter string 21								parameter string 20						
8	parameter string 27								parameter string 26								parameter string 25								parameter string 24						
9	not changed																parameter string 29								parameter string 28						

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
S	sequence bit	1 bit	a large data packet is transmitted in several partial sequences: 0 = data transmission completed 1 = data transmission not yet completed, at least one more packet follows
M	master no.	1 bit	0 = master 1 1 = master 2
TG	toggle bit	1 bit	value changes for each execution of the command
F	error bit	1 bit	0 = no error detected 1 = error when executing the command
DL	data length	6 bits	number of bytes to be transferred permitted values: 01…20_{hex} = 01…32_{dec} (→ data sheet of the slave)

Info

The control bytes defined in profile 7.4 with follow and valid bits are filtered out by the system.

Example: read parameter string of AS-i slave 3(A) on AS-i master 1

4931

Request from host to device

Word no.	Value [hex.]	Meaning
1	0822	S=0: sequence here always 0 M=0: AS-i master 1 UID=08: user ID changes to 8 22 = command 34
2	0300	03_{hex} = 03_{dec} = slave address 3(A)
3…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0822	S=0: last sequence copy of the request command processed, no error occurred
2	0608 8608	0xxx/8ξξx = the toggle bit changes after each execution x6xx = slave address 3(A), shifted 1 bit to the left 08 ⇒ 8 parameter strings received
3	1234	34 = parameter string 0 of slave 3 12 = parameter string 1 of slave 3
4	5678	78 = parameter string 2 of slave 3 56 = parameter string 3 of slave 3
5	1234	34 = parameter string 4 of slave 3 12 = parameter string 5 of slave 3
6	5678	78 = parameter string 6 of slave 3 56 = parameter string 7 of slave 3
7…18	0000	not changed

7.2.19 Module 19, command 35dec (23hex) – write parameter string of an AS-i slave with the profile S-7.4

4523

Request from host to device

10823

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	res.		ST	SLA					res.		DL						r.	S	M	UID					command number							
2	parameter string 3								parameter string 2								parameter string 1								parameter string 0							
3	parameter string 7								parameter string 6								parameter string 5								parameter string 4							
4	parameter string 11								parameter string 10								parameter string 9								parameter string 8							
5	parameter string 15								parameter string 14								parameter string 13								parameter string 12							
6	parameter string 19								parameter string 18								parameter string 17								parameter string 16							
7...9	not used																															

Legend:

S	sequence bit	1 bit	a large data packet is transmitted in several partial sequences: 0 = data transmission completed 1 = data transmission not yet completed, at least one more packet follows
M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	$00…1F_{hex} = 0…31_{dec}$ (a change to the user ID starts the command call)
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
SLA	slave address	5 bits	$00…1F_{hex} = 0…31_{dec}$
DL	data length	6 bits	number of bytes to be transferred permitted values: $01…20_{hex} = 01…32_{dec}$ (→ data sheet of the slave)

Response from device to host

10824

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	TG	ST	reflected slave address					F	res.		DL						E	S	M	reflected user ID								reflected command number				
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
S	sequence bit	1 bit	a large data packet is transmitted in several partial sequences: 0 = data transmission completed 1 = data transmission not yet completed, at least one more packet follows
M	master no.	1 bit	0 = master 1 1 = master 2
ST	slave type	1 bit	0 = single slave or A slave 1 = B slave (= addition of 20_{hex} or 32_{dec} to the slave address)
TG	toggle bit	1 bit	value changes for each execution of the command
F	error bit	1 bit	0 = no error detected 1 = error when executing the command
DL	data length	6 bits	number of bytes to be transferred permitted values: 01…20_{hex} = 01…32_{dec} (→ data sheet of the slave)

NOTE

The number of the bytes to be sent must be divisible by 2 since the system always can transmit only multiples of 2 bytes in the S7.4 protocol.

The control bytes defined in profile 7.4 with follow bit and valid bit are automatically added by the system. Therefore, without segmentation, this command is limited to 20 bytes of parameter data. Larger data volumes must be divided into several segments.

Example: write parameter string in AS-i slave 3(A) on AS-i master 1

4936

Request from host to device

Word no.	Value [hex.]	Meaning
1	0923	S=0: sequence here always 0 M=0: AS-i master 1 UID=09: user ID changes to 9 23 = command 35
2	0304	03_{hex} = 03_{dec} = slave address 3(A) 04 ⇒ send 4 parameter strings
3	1AF4	F4 = parameter string 0 for slave 3 2D = parameter string 1 for slave 3
4	5BB8	B8 = parameter string 2 for slave 3 5B = parameter string 3 for slave 3
5…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0923	S=0: last sequence copy of the request command processed, no error occurred
2	0604 8604	0xxx/8xxx = the toggle bit changes after each execution x6xx = slave address 3(A), shifted 1 bit to the left 04 = number of bytes to be received
3…18	0000	not changed

7.2.20 Module 19, command 50dec (32hex) – read current configuration AS-i slaves 0(A)...15(A)

4524

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10826

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	slave 1(A) ID2				slave 1(A) ID1				slave 1(A) ID code				slave 1(A) IO conf.				Slave 0 ID2				Slave 0 ID1				Slave 0 ID code				Slave 0 IO conf.			
3	slave 3(A) ID2				slave 3(A) ID1				slave 3(A) ID code				slave 3(A) IO conf.				slave 2(A) ID2				slave 2(A) ID1				slave 2(A) ID code				slave 2(A) IO conf.			
4	slave 5(A) ID2				slave 5(A) ID1				slave 5(A) ID code				slave 5(A) IO conf.				slave 4(A) ID2				slave 4(A) ID1				slave 4(A) ID code				slave 4(A) IO conf.			
5	slave 7(A) ID2				slave 7(A) ID1				slave 7(A) ID code				slave 7(A) IO conf.				slave 6(A) ID2				slave 6(A) ID1				slave 6(A) ID code				slave 6(A) IO conf.			
6	slave 9(A) ID2				slave 9(A) ID1				slave 9(A) ID code				slave 9(A) IO conf.				slave 8(A) ID2				slave 8(A) ID1				slave 8(A) ID code				slave 8(A) IO conf.			
7	slave 11(A) ID2				slave 11(A) ID1				slave 11(A) ID code				slave 11(A) IO conf.				slave 10(A) ID2				slave 10(A) ID1				slave 10(A) ID code				slave 10(A) IO conf.			
8	slave 13(A) ID2				slave 13(A) ID1				slave 13(A) ID code				slave 13(A) IO conf.				slave 12(A) ID2				slave 12(A) ID1				slave 12(A) ID code				slave 12(A) IO conf.			
9	slave 15(A) ID2				slave 15(A) ID1				slave 15(A) ID code				slave 15(A) IO conf.				slave 14(A) ID2				slave 14(A) ID1				slave 14(A) ID code				slave 14(A) IO conf.			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Example: read current configuration AS-i slaves 0(A)...15(A) on AS-i master 1

4940

Request from host to device

Word no.	Value [hex.]	Meaning
1	0232	M=0: AS-i master 1 UID=02: user ID changes to 2 32 = command 50
2…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0232	S=0: last sequence copy of the request command processed, no error occurred
2	00FF	reserved
3	FFFF	current configuration slave 0: ID2 =F, ID1=F, ID=F and IO=F
4	EF03	current configuration slave 1(A): ID2 =E, ID1=F, ID=0 and IO=3
…	…	…
18	EF37	current configuration slave 15(A): ID2 =E, ID1=F, ID=3 and IO=7

7.2.21 Module 19, command 51dec (33hex) – read current configuration AS-i slaves 16(A)...31(A)

4525

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)

Response from device to host

10828

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	slave 17(A) ID2				slave 17(A) ID1				slave 17(A) ID code				slave 17(A) IO conf.				slave 16(A) ID2				slave 16(A) ID1				slave 16(A) ID code				slave 16(A) IO conf.			
3	slave 19(A) ID2				slave 19(A) ID1				slave 19(A) ID code				slave 19(A) IO conf.				slave 18(A) ID2				slave 18(A) ID1				slave 18(A) ID code				slave 18(A) IO conf.			
4	slave 21(A) ID2				slave 21(A) ID1				slave 21(A) ID code				slave 21(A) IO conf.				slave 20(A) ID2				slave 20(A) ID1				slave 20(A) ID code				slave 20(A) IO conf.			
5	slave 23(A) ID2				slave 23(A) ID1				slave 23(A) ID code				slave 23(A) IO conf.				slave 22(A) ID2				slave 22(A) ID1				slave 22(A) ID code				slave 22(A) IO conf.			
6	slave 25(A) ID2				slave 25(A) ID1				slave 25(A) ID code				slave 25(A) IO conf.				slave 24(A) ID2				slave 24(A) ID1				slave 24(A) ID code				slave 24(A) IO conf.			
7	slave 27(A) ID2				slave 27(A) ID1				slave 27(A) ID code				slave 27(A) IO conf.				slave 26(A) ID2				slave 26(A) ID1				slave 26(A) ID code				slave 26(A) IO conf.			
8	slave 29(A) ID2				slave 29(A) ID1				slave 29(A) ID code				slave 29(A) IO conf.				slave 28(A) ID2				slave 28(A) ID1				slave 28(A) ID code				slave 28(A) IO conf.			
9	slave 31(A) ID2				slave 31(A) ID1				slave 31(A) ID code				slave 31(A) IO conf.				slave 30(A) ID2				slave 30(A) ID1				slave 30(A) ID code				slave 30(A) IO conf.			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

7.2.22 Module 19, command 52dec (34hex) – read current configuration AS-i slaves 0...15B

4526

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10830

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	slave 1B ID2				slave 1B ID1				slave 1B ID code				slave 1B IO conf.				slave 0B ID2				slave 0B ID1				slave 0B ID code				slave 0B IO conf.			
3	slave 3B ID2				slave 3B ID1				slave 3B ID code				slave 3B IO conf.				slave 2B ID2				slave 2B ID1				slave 2B ID code				slave 2B IO conf.			
4	slave 5B ID2				slave 5B ID1				slave 5B ID code				slave 5B IO conf.				slave 4B ID2				slave 4B ID1				slave 4B ID code				slave 4B IO conf.			
5	slave 7B ID2				slave 7B ID1				slave 7B ID code				slave 7B IO conf.				slave 6B ID2				slave 6B ID1				slave 6B ID code				slave 6B IO conf.			
6	slave 9B ID2				slave 9B ID1				slave 9B ID code				slave 9B IO conf.				slave 8B ID2				slave 8B ID1				slave 8B ID code				slave 8B IO conf.			
7	slave 11B ID2				slave 11B ID1				slave 11B ID code				slave 11B IO conf.				slave 10B ID2				slave 10B ID1				slave 10B ID code				slave 10B IO conf.			
8	slave 13B ID2				slave 13B ID1				slave 13B ID code				slave 13B IO conf.				slave 12B ID2				slave 12B ID1				slave 12B ID code				slave 12B IO conf.			
9	slave 15B ID2				slave 15B ID1				slave 15B ID code				slave 15B IO conf.				slave 14B ID2				slave 14B ID1				slave 14B ID code				slave 14B IO conf.			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

7.2.23 Module 19, command 53dec (35hex) – read current configuration AS-i slaves 16B...31B

4527

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10832

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	slave 17B ID2				slave 17B ID1				slave 17B ID code				slave 17B IO conf.				slave 16B ID2				slave 16B ID1				slave 16B ID code				slave 16B IO conf.			
3	slave 19B ID2				slave 19B ID1				slave 19B ID code				slave 19B IO conf.				slave 18B ID2				slave 18B ID1				slave 18B ID code				slave 18B IO conf.			
4	slave 21B ID2				slave 21B ID1				slave 21B ID code				slave 21B IO conf.				slave 20B ID2				slave 20B ID1				slave 20B ID code				slave 20B IO conf.			
5	slave 23B ID2				slave 23B ID1				slave 23B ID code				slave 23B IO conf.				slave 22B ID2				slave 22B ID1				slave 22B ID code				slave 22B IO conf.			
6	slave 25B ID2				slave 25B ID1				slave 25B ID code				slave 25B IO conf.				slave 24B ID2				slave 24B ID1				slave 24B ID code				slave 24B IO conf.			
7	slave 27B ID2				slave 27B ID1				slave 27B ID code				slave 27B IO conf.				slave 26B ID2				slave 26B ID1				slave 26B ID code				slave 26B IO conf.			
8	slave 29B ID2				slave 29B ID1				slave 29B ID code				slave 29B IO conf.				slave 28B ID2				slave 28B ID1				slave 28B ID code				slave 28B IO conf.			
9	slave 31B ID2				slave 31B ID1				slave 31B ID code				slave 31B IO conf.				slave 30B ID2				slave 30B ID1				slave 30B ID code				slave 30B IO conf.			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

7.2.24 Module 19, command 54dec (36hex) – read current parameters of the AS-i slaves

4528

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10834

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	parameters slave 8(A)				parameters slave 7(A)				parameters slave 6(A)				parameters slave 5(A)				parameters slave 4(A)				parameters slave 3(A)				parameters slave 2(A)				parameters slave 1(A)			
3	parameters slave 16(A)				parameters slave 15(A)				parameters slave 14(A)				parameters slave 13(A)				parameters slave 12(A)				parameters slave 11(A)				parameters slave 10(A)				parameters slave 9(A)			
4	parameters slave 24(A)				parameters slave 23(A)				parameters slave 22(A)				parameters slave 21(A)				parameters slave 20(A)				parameters slave 19(A)				parameters slave 18(A)				parameters slave 17(A)			
5	parameters slave 1B				parameters slave 31(A)				parameters slave 30(A)				parameters slave 29(A)				parameters slave 28(A)				parameters slave 27(A)				parameters slave 26(A)				parameters slave 25(A)			
6	parameters slave 9B				parameters slave 8B				parameters slave 7B				parameters slave 6B				parameters slave 5B				parameters slave 4B				parameters slave 3B				parameters slave 2B			
7	parameters slave 17B				parameters slave 16B				parameters slave 15B				parameters slave 14B				parameters slave 13B				parameters slave 12B				parameters slave 11B				parameters slave 10B			
8	parameters slave 25B				parameters slave 24B				parameters slave 23B				parameters slave 22B				parameters slave 21B				parameters slave 20B				parameters slave 19B				parameters slave 18B			
9	not changed								parameters slave 31B				parameters slave 30B				parameters slave 29B				parameters slave 28B				parameters slave 27B				parameters slave 26B			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Example: read current parameters of the AS-i slaves on AS-i master 1

4953

Request from host to device

Word no.	Value [hex.]	Meaning
1	0636	M=0: AS-i master 1 UID=06: user ID changes to 6 36 = command 54
2…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0636	S=0: last sequence copy of the request command processed, no error occurred
2	00FF	reserved
3	4321	1 = parameter of slave 1(A) 2 = parameter of slave 2(A) 3 = parameter of slave 3(A) 4 = parameter of slave 4(A)
4	8765	5 = parameter of slave 5(A) 6 = parameter of slave 6(A) 7 = parameter of slave 7(A) 8 = parameter of slave 8(A)
…	…	…
18	0098	8 = parameter of slave 30(A) 9 = parameter of slave 31B

7.2.25 Module 19, command 55dec (37hex) – read current AS-i slave lists

4529

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10836

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																D	B	M	reflected user ID					reflected command number							
2	LAS for slave group 2																LAS for slave group 1															
3	LAS for slave group 4																LAS for slave group 3															
4	LDS for slave group 2																LDS for slave group 1															
5	LDS for slave group 4																LDS for slave group 3															
6	LPF for slave group 2																LPF for slave group 1															
7	LPF for slave group 4																LPF for slave group 3															
8	LPS for slave group 2																LPS for slave group 1															
9	LPS for slave group 4																LPS for slave group 3															

Slave group	Bit / AS-i slave address															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	15(A)	14(A)	13(A)	12(A)	11(A)	10(A)	9(A)	8(A)	7(A)	6(A)	5(A)	4(A)	3(A)	2(A)	1(A)	0 *)
2	31(A)	30(A)	29(A)	28(A)	27(A)	26(A)	25(A)	24(A)	23(A)	22(A)	21(A)	20(A)	19(A)	18(A)	17(A)	16(A)
3	15B	14B	13B	12B	11B	10B	9B	8B	7B	6B	5B	4B	3B	2B	1B	res
4	31B	30B	29B	28B	27B	26B	25B	24B	23B	22B	21B	20B	19B	18B	17B	16B

*) LAS and LPS have no slave 0, therefore this bit is set to 0!

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Example: read current AS-i slave lists

4957

Request from host to device

Word no.	Value [hex.]	Meaning
1	0737	M=0: AS-i master 1 UID=07: user ID changes to 7 37 = command 55
2…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0737	S=0: last sequence copy of the request command processed, no error occurred
2	00FF	reserved
3	0102	LAS of slaves (0) to 15(A) 0102_{hex} = 0000 0001 0000 0010_{bin} ⇒ slaves 1(A) and 8(A) are active
4	8001	LAS of slaves 16(A) to 31(A) 8001_{hex} = 1000 0000 0000 0001_{bin} ⇒ slaves 16(A) and 31(A) are active
…	…	…
18	8001	LPS of slaves 16B to 31B 8001_{hex} = 1000 0000 0000 0001_{bin} ⇒ slaves 16B and 31B are projected

7.2.26 Module 19, command 56dec (38hex) – read projected configuration AS-i slaves 1(A)...15(A)

4530

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10826

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	slave 1(A) ID2				slave 1(A) ID1				slave 1(A) ID code				slave 1(A) IO conf.				Slave 0 ID2				Slave 0 ID1				Slave 0 ID code				Slave 0 IO conf.			
3	slave 3(A) ID2				slave 3(A) ID1				slave 3(A) ID code				slave 3(A) IO conf.				slave 2(A) ID2				slave 2(A) ID1				slave 2(A) ID code				slave 2(A) IO conf.			
4	slave 5(A) ID2				slave 5(A) ID1				slave 5(A) ID code				slave 5(A) IO conf.				slave 4(A) ID2				slave 4(A) ID1				slave 4(A) ID code				slave 4(A) IO conf.			
5	slave 7(A) ID2				slave 7(A) ID1				slave 7(A) ID code				slave 7(A) IO conf.				slave 6(A) ID2				slave 6(A) ID1				slave 6(A) ID code				slave 6(A) IO conf.			
6	slave 9(A) ID2				slave 9(A) ID1				slave 9(A) ID code				slave 9(A) IO conf.				slave 8(A) ID2				slave 8(A) ID1				slave 8(A) ID code				slave 8(A) IO conf.			
7	slave 11(A) ID2				slave 11(A) ID1				slave 11(A) ID code				slave 11(A) IO conf.				slave 10(A) ID2				slave 10(A) ID1				slave 10(A) ID code				slave 10(A) IO conf.			
8	slave 13(A) ID2				slave 13(A) ID1				slave 13(A) ID code				slave 13(A) IO conf.				slave 12(A) ID2				slave 12(A) ID1				slave 12(A) ID code				slave 12(A) IO conf.			
9	slave 15(A) ID2				slave 15(A) ID1				slave 15(A) ID code				slave 15(A) IO conf.				slave 14(A) ID2				slave 14(A) ID1				slave 14(A) ID code				slave 14(A) IO conf.			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

Example: read projected configuration AS-i slaves 0(A)...15(A) on AS-i master 1

4961

Request from host to device

Word no.	Value [hex.]	Meaning
1	0238	M=0: AS-i master 1 UID=02: user ID changes to 2 38 = command 56
2…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0238	copy of the request command processed, no error occurred
2	00FF	reserved
3	FFFF	here not used since slave 0 cannot be projected
4	EF03	projected configuration slave 1(A): ID2 =E, ID1=F, ID=0 and IO=3
…	…	…
18	EF37	projected configuration slave 15(A): ID2 =E, ID1=F, ID=3 and IO=7

7.2.27 Module 19, command 57dec (39hex) – read projected configuration AS-i slaves 16(A)...31(A)

4531

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10828

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	slave 17(A) ID2				slave 17(A) ID1				slave 17(A) ID code				slave 17(A) IO conf.				slave 16(A) ID2				slave 16(A) ID1				slave 16(A) ID code				slave 16(A) IO conf.			
3	slave 19(A) ID2				slave 19(A) ID1				slave 19(A) ID code				slave 19(A) IO conf.				slave 18(A) ID2				slave 18(A) ID1				slave 18(A) ID code				slave 18(A) IO conf.			
4	slave 21(A) ID2				slave 21(A) ID1				slave 21(A) ID code				slave 21(A) IO conf.				slave 20(A) ID2				slave 20(A) ID1				slave 20(A) ID code				slave 20(A) IO conf.			
5	slave 23(A) ID2				slave 23(A) ID1				slave 23(A) ID code				slave 23(A) IO conf.				slave 22(A) ID2				slave 22(A) ID1				slave 22(A) ID code				slave 22(A) IO conf.			
6	slave 25(A) ID2				slave 25(A) ID1				slave 25(A) ID code				slave 25(A) IO conf.				slave 24(A) ID2				slave 24(A) ID1				slave 24(A) ID code				slave 24(A) IO conf.			
7	slave 27(A) ID2				slave 27(A) ID1				slave 27(A) ID code				slave 27(A) IO conf.				slave 26(A) ID2				slave 26(A) ID1				slave 26(A) ID code				slave 26(A) IO conf.			
8	slave 29(A) ID2				slave 29(A) ID1				slave 29(A) ID code				slave 29(A) IO conf.				slave 28(A) ID2				slave 28(A) ID1				slave 28(A) ID code				slave 28(A) IO conf.			
9	slave 31(A) ID2				slave 31(A) ID1				slave 31(A) ID code				slave 31(A) IO conf.				slave 30(A) ID2				slave 30(A) ID1				slave 30(A) ID code				slave 30(A) IO conf.			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

7.2.28 Module 19, command 58dec (3Ahex) – read projected configuration AS-i slaves 1B...15B

4532

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10830

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	slave 1B ID2				slave 1B ID1				slave 1B ID code				slave 1B IO conf.				slave 0B ID2				slave 0B ID1				slave 0B ID code				slave 0B IO conf.			
3	slave 3B ID2				slave 3B ID1				slave 3B ID code				slave 3B IO conf.				slave 2B ID2				slave 2B ID1				slave 2B ID code				slave 2B IO conf.			
4	slave 5B ID2				slave 5B ID1				slave 5B ID code				slave 5B IO conf.				slave 4B ID2				slave 4B ID1				slave 4B ID code				slave 4B IO conf.			
5	slave 7B ID2				slave 7B ID1				slave 7B ID code				slave 7B IO conf.				slave 6B ID2				slave 6B ID1				slave 6B ID code				slave 6B IO conf.			
6	slave 9B ID2				slave 9B ID1				slave 9B ID code				slave 9B IO conf.				slave 8B ID2				slave 8B ID1				slave 8B ID code				slave 8B IO conf.			
7	slave 11B ID2				slave 11B ID1				slave 11B ID code				slave 11B IO conf.				slave 10B ID2				slave 10B ID1				slave 10B ID code				slave 10B IO conf.			
8	slave 13B ID2				slave 13B ID1				slave 13B ID code				slave 13B IO conf.				slave 12B ID2				slave 12B ID1				slave 12B ID code				slave 12B IO conf.			
9	slave 15B ID2				slave 15B ID1				slave 15B ID code				slave 15B IO conf.				slave 14B ID2				slave 14B ID1				slave 14B ID code				slave 14B IO conf.			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

7.2.29 Module 19, command 59dec (3Bhex) – read projected configuration AS-i slaves 16B...31B

4533

Request from host to device

10771

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.		M	UID					command number							
2...9	not used																															

Legend:

M	master no.	1 bit	0 = master 1 1 = master 2
UID	user ID	5 bits	00…$1F_{hex}$ = 0…31_{dec} (a change to the user ID starts the command call)

Response from device to host

10832

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	M	reflected user ID					reflected command number						
2	slave 17B ID2				slave 17B ID1				slave 17B ID code				slave 17B IO conf.				slave 16B ID2				slave 16B ID1				slave 16B ID code				slave 16B IO conf.			
3	slave 19B ID2				slave 19B ID1				slave 19B ID code				slave 19B IO conf.				slave 18B ID2				slave 18B ID1				slave 18B ID code				slave 18B IO conf.			
4	slave 21B ID2				slave 21B ID1				slave 21B ID code				slave 21B IO conf.				slave 20B ID2				slave 20B ID1				slave 20B ID code				slave 20B IO conf.			
5	slave 23B ID2				slave 23B ID1				slave 23B ID code				slave 23B IO conf.				slave 22B ID2				slave 22B ID1				slave 22B ID code				slave 22B IO conf.			
6	slave 25B ID2				slave 25B ID1				slave 25B ID code				slave 25B IO conf.				slave 24B ID2				slave 24B ID1				slave 24B ID code				slave 24B IO conf.			
7	slave 27B ID2				slave 27B ID1				slave 27B ID code				slave 27B IO conf.				slave 26B ID2				slave 26B ID1				slave 26B ID code				slave 26B IO conf.			
8	slave 29B ID2				slave 29B ID1				slave 29B ID code				slave 29B IO conf.				slave 28B ID2				slave 28B ID1				slave 28B ID code				slave 28B IO conf.			
9	slave 31B ID2				slave 31B ID1				slave 31B ID code				slave 31B IO conf.				slave 30B ID2				slave 30B ID1				slave 30B ID code				slave 30B IO conf.			

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
M	master no.	1 bit	0 = master 1 1 = master 2

7.2.30 Module 19, command 96dec (60hex) – save data non-volatilely in the flash memory of the device

4534

Request from host to device

10842

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.			UID					command number							
2	not used																reserved = 0								Area number							
3...9	not used																															

Legend:

UID	user ID	5 bits	$00…1F_{hex} = 0…31_{dec}$ (a change to the user ID starts the command call)

Response from device to host

10843

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	r.	reflected user ID					reflected command number							
2	not changed																reserved = 0								reflected area number							
9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

Example: save configuration of AS-i master 1

4974

Request from host to device

Word no.	Value [hex.]	Meaning
1	0960	UID=09: user ID changes to 9 60 = command 96
2	0000	reserved
3	0002	area number = 2 ⇒ non-volatilely saves the configuration of AS-i master 1
4…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0960	copy of the request command processed, no error occurred
2	0000	reserved
3	001E	reflected command data
4…18	0000	not changed

7.2.31 Module 19, command 97dec (61hex) – carry out various settings in the device

4535

Request from host to device

10845

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.		UID						command number							
2	not used																reserved = 0								command number							
3...9	not used																															

Legend:

UID	user ID	5 bits	$00…1F_{hex} = 0…31_{dec}$ (a change to the user ID starts the command call)
	command number	1 byte	10_{hex} = changes the operating mode of the PLC (without function in the gateway), (according parameters → word 4) 12_{hex} = reset all slave error counters 13_{hex} = reset configuration error counter 14_{hex} = reset AS-i cycle error counter

Response from device to host

10846

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																E	B	r.	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

Example: carry out settings in the device

4980

Request from host to device

Word no.	Value [hex.]	Meaning
1	0961	UID=09: user ID changes to 9 61 = command 97
2	0000	reserved
3	0002	command number = 2 ⇒ sets the operation mode of the PLC to RUN
4…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0961	copy of the request command processed, no error occurred
2…18	0000	not changed

7.2.32 Module 19, command 102dec (66hex) – retrieve the status of the device display

4536

Request from host to device

10848

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																res.			UID					command number							
2	not used																reserved = 0								command number							
3...9	not used																															

Legend:

UID	user ID	5 bits	00…1F$_{hex}$ = 0…31$_{dec}$ (a change to the user ID starts the command call)
	command number	1 byte	01 = reads the current menu status 02 = jumps to the start menu screen no. 0 03 = jumps to the user menu screen no. 161 04 = deletes the → empty screen, only for user menus 05 = writes a defined string to a defined position in the display, only for user menus: parameter 1 = X position (1…128 pixels) parameter 2 = Y position(1…8 lines per 8 pixels) parameter 3 = character set and representation (values can be combined): 00x1 = "Small" 00x2 = "Big" 00x3 = "Fix" 00x4 = "Bitmap" 00x5 = "Big underlined" 001x = delete line invertedly (→ black bar) 002x = do not delete points 1 to X 004x = do not delete from string end to point 128 008x = shows the string invertedly parameter 4…5 = pointer towards string (string with "0000" completed) 06 = writes a defined "byte matrix" at a defined position in the display, only for user menus: parameter 1 = X1 position upper left (1…128 pixels) parameter 2 = Y1 position upper left (1…8 lines 8 pixels each) parameter 3 = X2 position bottom right (1…128 pixels) parameter 4 = Y2 position bottom right (1…8 lines 8 pixels each) parameter 5…6 = pointer towards byte matrix (1 byte corresponds to a vertical field of 8 pixels height, bit 0 = top … Bit 7 = bottom) 07 = shows a defined arrow in the display next to the image number, only for user menus: parameter = 0001 → ▲ parameter = 0002 → ▼ parameter = 0003 → ▲ + ▼ -- continued on the following page --

	command number	1 byte	-- continued -- 08 = defines the texts allocated to the outer keys, only for user menus: parameter 1 = key index (0…13) parameter 2 = definition of the key index, e.g.:

Index	left key	right key
0000	OK	ESC
0001	==>	ESC
0002	MORE	ESC
0003	NEXT	ESC
0004	OK	
0005		ESC
0006	MORE	MENU
0007	OK	MENU
0008	MENU	USER
0009	<==	ESC
000A	INFO	ESC
000B	CLEAR	ESC
000C		
000D	-WAIT-	-WAIT-

Response from device to host (command number = 0001)

10849

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	r.	reflected user ID					reflected command number							
2	active menu area																pressed keys															
3	currently displayed menu window																process error occurred															
4	not changed																activated system language															
5...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command	
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used	
	keys pressed	1 word	0001 = bit 0: left key 0002 = bit 1: key [▲] 0004 = bit 2: key [▼] 0008 = bit 3: right key	combinations possible by adding the values
	activated menu area	1 word	00A0 = system menu active 00A1 = user menu active 00AE = process error display active (E10...E30) 00AF = system error display active (acknowledgement required)	
	process error occurred	1 word	0000 = no process errors given 0001 = one or more process errors given	
	currently displayed menu window	1 word	number of the menu screen	
	activated system language	1 word	0000 = menu display in English 0001 = menu display in the second system language	

Response from device to host (command number = 0002)

10850

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																E	B	r.	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

Response from device to host (command number = 0003)

10851

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																E	B	r.	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

Response from device to host in the normal case (command number = 0004...0008)

10852

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not changed																E	B	r.	reflected user ID					reflected command number							
2...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

Response from device to host in case of a fault (command number = 0004...0008)

10853

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	r.	reflected user ID					reflected command number							
2	not changed																not changed													error code		
3...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used

Possible command error codes

10854

Value [hex]	Meaning
AD	Access denied. The user menu must be active!
E0	parameter invalid

Example: retrieve the status of the device display

4997

Request from host to device

Word no.	Value [hex.]	Meaning
1	0766	UID=07: user ID changes to 7 66 = command 102
2	0000	reserved
3	0001	command number = 0001 ⇒ reads the current menu status
4…18	0000	not used here

Response from device to host

Word no.	Value [hex.]	Meaning
1	0766	copy of the request command processed, no error occurred
2	0000	reserved
3	0008	0008 = bit 3 ⇒ right button is actuated
4	00A0	00A0 = system menu active
5	0001	0001 = one or more process errors given
6	001B	$001B_{hex} = 0027_{dec}$ ⇒ menu screen "Quick Setup" is currently displayed
7	0000	0000 = the English menus are displayed
8…18	0000	not changed

7.2.33 Module 19, command 105dec (69hex) – read the properties of the device

4537

Request from host to device

10856

DW	Data content																													
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	not used																res.			UID					command number							
2...9	not used																															

Legend:

UID	user ID	5 bits	$00\ldots1F_{hex} = 0\ldots31_{dec}$ (a change to the user ID starts the command call)

Response from device to host

10857

DW	Data content																															
Bit DW	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	Word n+1																Word n															
Bit word	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
DW 1	reserved = 0																E	B	r.	reflected user ID					reflected command number							
2	reserved								AT								2M	DP	EN	reserved					Mod							
3	hardware version																reserved								flash memory type							
4	RTS firmware release number																RTS firmware version number															
5	AS-i master 1 firmware release number																AS-i master 1 firmware version number															
6	AS-i master 2 firmware release number																AS-i master 2 firmware version number															
7	Linux ramdisk version																Linux kernel version															
8...9	not changed																															

Legend:

E	error bit	1 bit	0 = no error detected 1 = error when executing the command
B	busy	1 bit	0 = command processed, buffer response valid 1 = command in process, channel used
2M	2 AS-i master	1 bit	0 = unit has 1 AS-i master 1 = unit has 2 AS-i masters
DP	Profibus DP	1 bit	0 = fieldbus interface Profibus DP not available 1 = fieldbus interface Profibus DP available
EN	Ethernet	1 bit	0 = Ethernet programming interface not available 1 = Ethernet programming interface available
Mod	PLC mode	1 byte	$0000\ 0001_{bin} = 01_{dec}$ = PLC in RUN $0000\ 0010_{bin} = 02_{dec}$ = PLC in STOP $0000\ 0100_{bin} = 04_{dec}$ = PLC stops at the breakpoint $0000\ 1000_{bin} = 08_{dec}$ = gateway mode
AT	Anybus type	1 byte	01 = Anybus Profibus DP 04 = Anybus CANopen 05 = Anybus DeviceNet 09 = Anybus Ethernet IT 0A = Anybus Ethernet/IP 0B = ifm Profibus DP 0C = no fieldbus module detected

Example: read the device properties of the controllerE

5006

Request from host to device

Word no.	Value [hex.]	Meaning
1	0669	UID=06: user ID changes to 6 69 = command 105
2…18	0000	not used

Response from device to host

Word no.	Value [hex.]	Meaning
1	0669	copy of the request command processed, no error occurred
2	0000	reserved
3	0008	0008_{hex} = 0000 0000 0000 1000_{bin} 2M = 0 ⇒ unit contains 1 AS-i master DP = 0 ⇒ fieldbus interface Profibus DP not available EN = 0 ⇒ Ethernet programming interface not available PLC mode = 08 ⇒ gateway mode
4	000B	Anybus type = 000B ⇒ ifm Profibus DP
5	0002	flash memory type
6	1000	hardware version
7	0002	1st part of the RTS firmware version (here: 02.218B): version number 02.xxxx
8	218B	2nd part of the RTS firmware version (here: 02.218B) : release number xx.218B
9	0000	1st part of the AS-i master 1 firmware version (here: 0.238A): version number 0.xxxx
10	238A	2nd part of the AS-i master 1 firmware version (here: 0.238A): version number x.238A
11	0000	1st part of the AS-i master 2 firmware version (here: 0.238A): version number 0.xxxx
12	238A	2nd part of the AS-i master 2 firmware version (here: 0.238A): version number x.238A
13	0196	Linux kernel version: 406
14	0A6E	Linux ramdisk version 10.110
15…18	0000	not changed

8 Operating and display elements

Contents

4538

Diagnostic LEDs Key functions Display basic functions	→ separate basic device manual

8.1 Status LEDs on the network connection

10708

4 status LEDs on the device inform about the status of the Ethernet interface and the systems connected to it:

Net State	O	O	Module State
not used	O	O	not used

Graphics: status LEDs on the network connection

8.1.1 LED [network status]

10709

LED status	Description
off	no supply voltage or not online
permanently green	online the connection to a DeviceNet scanner is established
green flashing	online no connection to a DeviceNet scanner is established
permanently red	critical connection error
red flashing	timeout of the connection monitoring
red / green alternatively	active self-test

8.1.2 LED [module status]

10710

LED status	Description
off	no supply voltage
permanently green	the interface card is in the normal operating status
green flashing	automatic baud rate detection running
permanently red	significant, non reversible error detected
red flashing	insignificant, reversible error detected
red / green alternatively	active self-test

9 Menu

Contents

4544

Info

All menu texts in this manual are in English.

Basic functions → separate basic instructions of the device manual

9.1 Main menu [Quick Setup]

10712

Setting and reading of the fieldbus parameters (password level 1 required).

Details → chapter Setting and reading of the fieldbus parameters (→ page 224)

Menu tree	Explanation
Quick setup ⇒ Fieldbus Setup	> Display of the current IP address ► Change the fieldbus address using the keys [▲] / [▼] ► After pressing [OK]: > Display of the fieldbus baud rate ► Change the fieldbus baud rate using the keys [▲] / [▼] ► After pressing [OK]: > Display of the fieldbus module 1 ► Change fieldbus module 1 using the keys [▲] / [▼] ► After pressing [OK]: > Display of the fieldbus module 2 > … ► Change fieldbus module 19 using the keys [▲] / [▼] ► After pressing [OK]: > Display of the fieldbus module 1 > … ► After pressing [ESC] twice: > Return to the start screen

9.2 Main menu [Fieldbus Setup]

10713

4546

Setting and reading of the fieldbus parameters (password level 1 required).
Details → chapter Setting and reading of the fieldbus parameters (→ page 224)

Menu tree	Explanation
Fieldbus Setup	> Display of the current IP address ► Change the fieldbus address using the keys [▲] / [▼] ► After pressing [OK]: > Display of the fieldbus baud rate ► Change the fieldbus baud rate using the keys [▲] / [▼] ► After pressing [OK]: > Display of the fieldbus module 1 ► Change fieldbus module 1 using the keys [▲] / [▼] ► After pressing [OK]: > Display of the fieldbus module 2 > … ► Change fieldbus module 19 using the keys [▲] / [▼] ► After pressing [OK]: > Display of the fieldbus module 1 > … ► After pressing [ESC] twice: > Return to the start screen

10 Set-up

Contents

10715

This chapter shows you how to get the DeviceNet fieldbus interface started quickly

10.1 Basic settings of the fieldbus interface

10716

NOTE

The settings on the device must meet the following conditions:

- The fieldbus address in the network must be unique.

Otherwise the following errors can occur:

- No data transfer with the device possible.
- Or the connected network will be completely inoperable.

The necessary settings of the fieldbus interface of the device can be made by means of the integrated display and the four operating keys. In the menu [Fieldbus Setup] the user can make all the necessary basic settings or view the present configuration:

[Menu] > [Fieldbus Setup] or:
[Menu] > [Quick Setup] > [Fieldbus Setup]

In any case the following parameters must be set on the unit for use on DeviceNet:

- the fieldbus address
- the fieldbus baud rate.

10.2 Set the parameters of the device

10859

10.2.1 Parameter setting of slaves in the controllerE

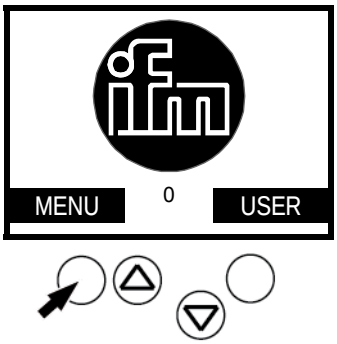
4550

Set the parameters of the slaves in the AS-i controllerE as described in the basic device manual.

10.2.2 Parameter setting of the fieldbus interface in the controllerE

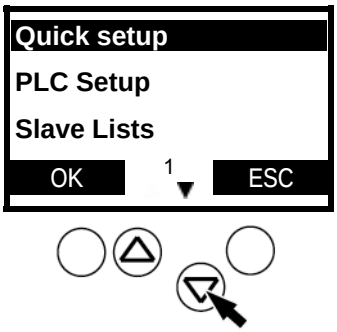
10717

[Menu] > [Fieldbus Setup] > set the fieldbus address > set the fieldbus baud rate > [OK]



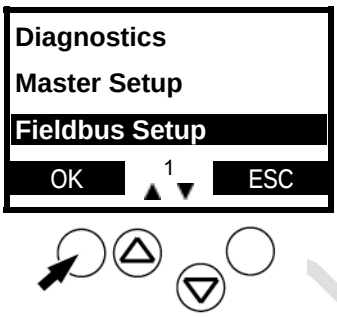
Step 1:

► Press [Menu].



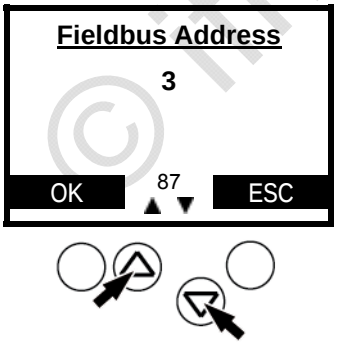
Step 2:

► Press [▼] to scroll to [Fieldbus Setup].



Step 3:

► Use [OK] to select [Fieldbus Setup].



Step 4:

> Display of the current fieldbus address.

► Press [▲] / [▼] to scroll to the requested address.

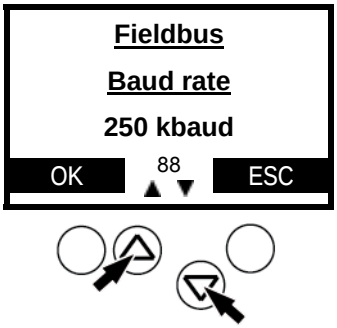
► Press [ESC] to quit without changes.

> The current fieldbus address remains valid.

OR:

► Confirm the new fieldbus address with [OK].

> The new fieldbus address becomes valid.



Step 5:

> Display current fieldbus baud rate

► Go to the required fieldbus baud rate with [▲] / [▼].

► Confirm the new fieldbus baud rate with [OK].

OR:

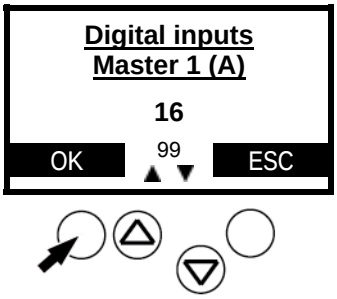
► Press [ESC] to quit without changes.

Continued in the next chapter.

10.2.3 Setting and reading of the fieldbus parameters

10722

Continued from the preceding chapter. Details → chapter The fieldbus modules (→ page 37)



Step 6:

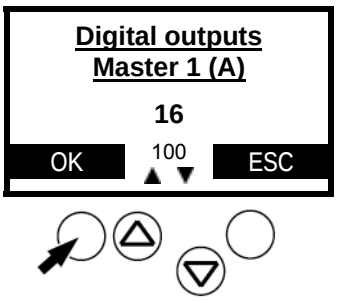
> Indicates that the fieldbus module 1 (digital input master 1(A)) with a length of 16 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 7:

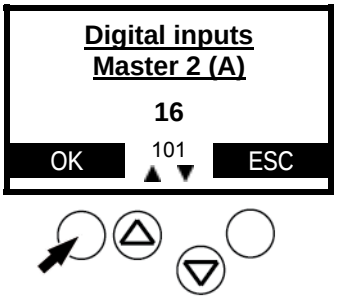
> Indicates that the fieldbus module 2 (digital output master 1(A)) with a length of 16 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 8:

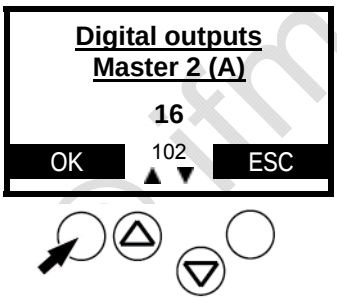
> Indicates that the fieldbus module 3 (digital input master 2(A)) with a length of 16 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 9:

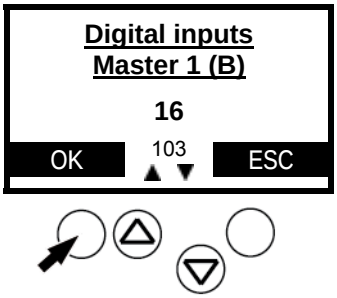
> Indicates that the fieldbus module 4 (digital output master 2(A)) with a length of 16 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 10:

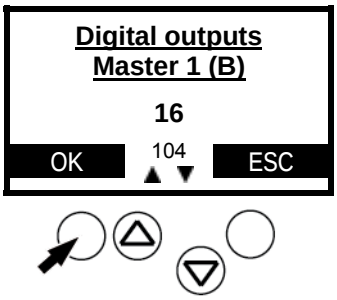
> Indicates that the fieldbus module 5 (digital input master 1B) with a length of 16 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 11:

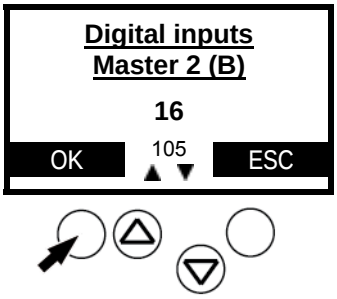
> Indicates that the fieldbus module 6 (digital output master 1B) with a length of 16 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 12:

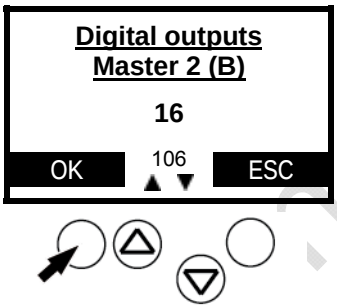
> Indicates that the fieldbus module 7 (digital input master 2B) with a length of 16 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 13:

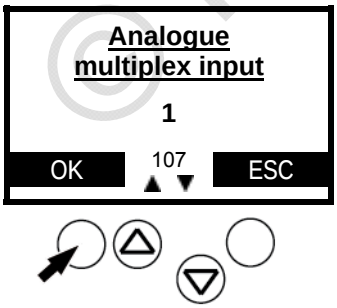
> Indicates that the fieldbus module 8 (digital output master 2B) with a length of 16 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 14:

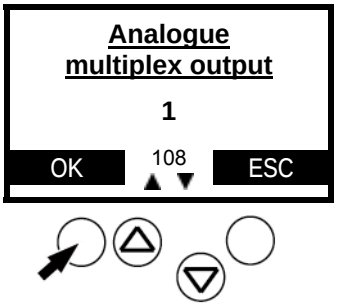
> Indicates that the fieldbus module 9 (analogue multiplex input) is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 15:

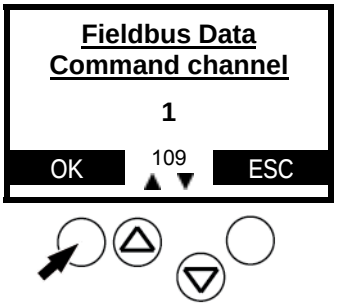
> Indicates that the fieldbus module 10 (analogue multiplex output) is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 16:

> Indicates that the fieldbus module 11 (fieldbus data command channel) is activated.

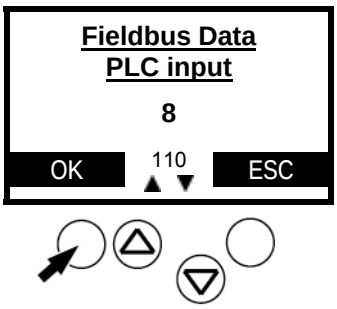
► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]

10858



Step 17:

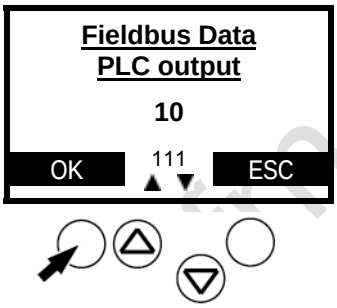
> Indicates that the fieldbus module 12 (fieldbus data PLC input) with a length of 8 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 18:

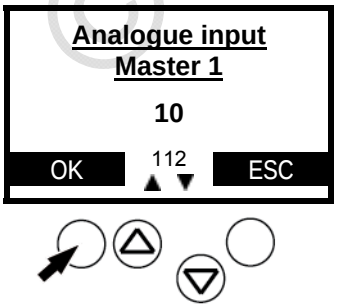
> Indicates that the fieldbus module 13 (fieldbus data PLC output) with a length of 8 bytes is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 19:

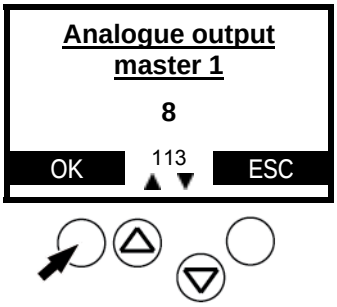
> Indicates that the fieldbus module 14 (analogue input master 1) with a length of 10 x 4 words is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 20:

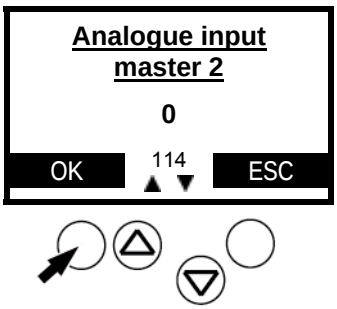
> Indicates that the fieldbus module 15 (analogue output master 1) with a length of 8 x 4 words is activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 21:

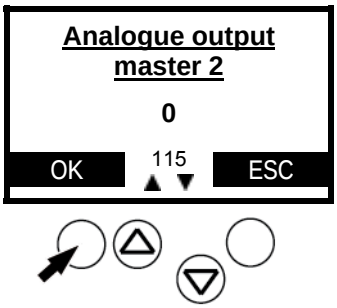
> Indicates that the fieldbus module 16 (analogue input master 2) is not activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 22:

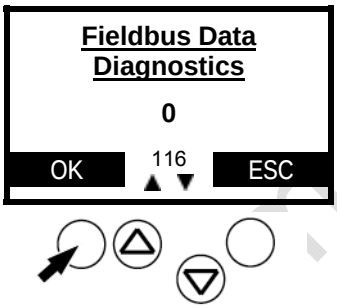
> Indicates that the fieldbus module 17 (analogue output master 1) is not activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 23:

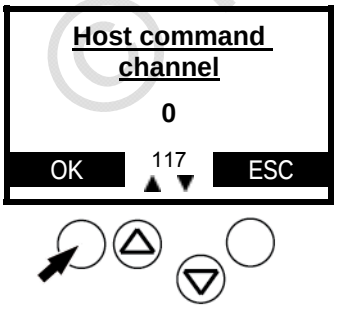
> Indicates that the fieldbus module 18 (fieldbus data diagnosis) is not activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 24:

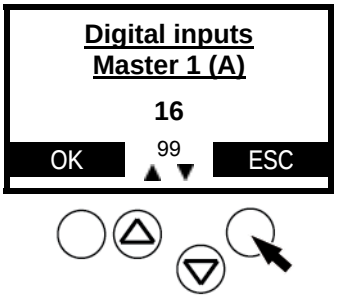
> Indicates that the fieldbus module 19 (host command channel) is not activated.

► Press [▲] / [▼] to set the requested number of bytes.

► Press [OK] to save the settings and scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]



Step 25:

> Repetition of the display series (→ step 9)

► Press [OK] to scroll to the next display.

OR:

► Use [ESC] to return to screen 87 [Fieldbus IP Address]

10.3 Store system parameters

10860

→ Basic device manual

11 Glossary of Terms

A

A/B slave

AS-i slave with an A or B being appended to its address number and which may therefore be present twice on the →master.

Acyclic data transmission

Usually data are transmitted to one slave at a time by the master once per cycle (= cyclic data transmission). Data transmission only at certain events (e.g. when the device is switched on or when values have been changed) is called acyclic data transmission.

Address

This is the "name" of the bus participant. All participants need a unique address so that the signals can be exchanged without problem.

Application software

Software specific to the application, implemented by the machine manufacturer, generally containing logic sequences, limits and expressions that control the appropriate inputs, outputs, calculations and decisions

Necessary to meet the specific (→SRP/CS) requirements.
→ Programming language, safety-related

Architecture

Specific configuration of hardware and software elements in a system.

AS-i

The AS-Interface (AS-i = Actuator Sensor Interface) is a standard for fieldbus communication to EN 50295 and IEC 62026-2. It was developed for the connection of actuators and sensors with a simple wiring to replace the conventional parallel wiring.

An unscreened two-wire yellow flat cable (max. 500 m) serves for data transmission as well as for voltage supply (24...30 V DC) for the communication electronics and for participants with a low current requirement. Loads with a greater energy requirement additionally receive a separate (black) flat cable for energy supply with 24 V DC.

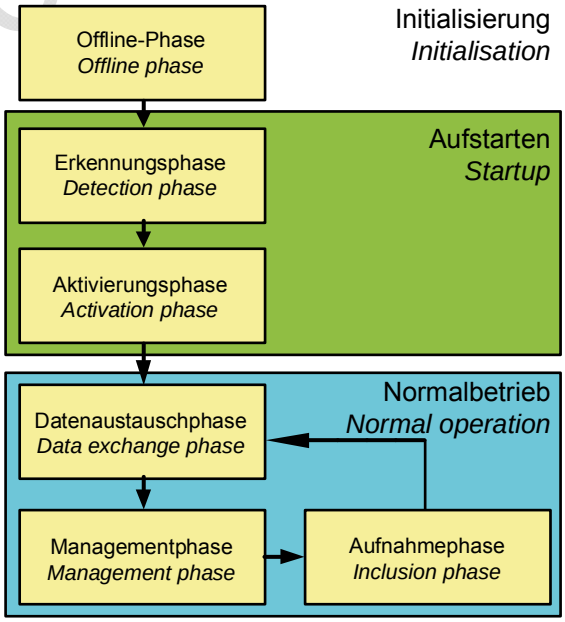
AS-Interface is a single master system. Up to 62 slaves can be connected per master. Each of these slaves needs an unambiguous address. The master cyclically polls (→polling) all projected slaves and exchanges the up to 248 input data and 186 output data with them.

More information → www.as-interface.net AS-International Association (user association)

AS-i cycle

An AS-i cycle contains the data exchange of up to 31 slaves plus a telegram inclusion phase plus, if required, a telegram management phase (→ AS-i phases (status machine) (→ page 229)). In the case of the extended addressing mode, two AS-i cycles are required for data transfer to all A/B slaves.

AS-i phases (status machine)



- Offline phase: No AS-i data traffic takes place during initialisation.
- Detection phase: In the detection phase, the AS-i master first of all searches for existing slaves - irrespective of whether they are projected or not.
- Activation phase: In this phase, the found slaves are activated depending on the operating mode.

- Data exchange phase: The AS-i master carries out cyclical data exchange with the activated slaves.
- Management phase: At the end of a cycle the AS-i master goes into the management phase, during which the master can send a command to a specific slave (if requested).
- Inclusion phase: After this, the AS-i master goes into the inclusion phase, during which it sends a command to a free slave address to detect new slaves.

ASIsafe

The name for Safety at Work used by Siemens.

B

Baud

Baud, abbrev.: Bd = unit for the data transmission speed. Do not confuse baud with "bits per second" (bps, bits/s). Baud indicates the number of changes of state (steps, cycles) per second over a transmission length. But it is not defined how many bits per step are transmitted. The name baud can be traced back to the French inventor J. M. Baudot whose code was used for telex machines.

1 MBd = 1024 x 1024 Bd = 1 048 576 Bd

Burst errors

Burst errors are errors occurring depending on others. The class indicates the maximum permissible number of burst errors:
Class 1 = high protection,
Class 2 = lower protection etc.

Bus

Serial data transmission of several participants on the same cable.

C

CCDI

CCDI = **C**TT **C**onfiguration **D**ata **I**mage = current CTT configuration

Configuration of 7.4 and 7.5 slaves currently determined by the AS-i master:
- Manufacturer ID,
- Vendor ID,
- Device ID,
- Device Group ID.

CDI

CDI = **C**onfiguration **D**ata **I**mage = current AS-i configuration

The configuration of the connected AS-i slaves determined by the AS-i master:
LDS and AS-i profiles (IO, ID, ID1, ID2)

CoDeSys

CoDeSys® is a registered trademark of 3S – Smart Software Solutions GmbH, Germany.

"CoDeSys for Automation Alliance" associates companies of the automation industry whose hardware devices are all programmed with the widely used IEC 61131-3 development tool CoDeSys®.

Homepage → http://www.3s-software.com

ControllerE

Master in the AS-i bus system of the generation E.

CTT

e.g. CTT2 = Combined Transaction Type 2

Cycle time

This is the time for one cycle. The following happens:

- PLC cycle: The PLC program performs one complete run.
- AS-i cycle: all AS-i slaves are updated (5...10 ms).
  The cycle time mainly depends on the AS-i slaves involved in the data exchange. Message errors and management phase may extend the cycle time (⇒□no constant cycle time).

Cyclic data transmission

Data are transmitted to one slave at a time by the master once per cycle.

Cyclical polling

AS-i master cyclically polls the data of all →slaves in the bus (see above). The data is updated in the →master after max. 5 ms. If A/B slaves are used, the →cycle time can be extended to 10 ms.

D

Data image (AS-i)

See →process image; sum of all digital and analogue input and output data.

As regards the time, the data image represents the current condition of each individual slave and NOT a consistent image of the entire AS-i network at an exact point in time.

DeviceNet

Fieldbus system for larger data volumes based on →CAN technology, requires special cables, complex connection technology. Can be used e.g. as a supplier for AS-i over longer distances. Corresponding →gateways are available.

DHCP

DHCP = **D**ynamic **H**ost **C**onfiguration **P**rotocol = protocol for the dynamic configuration by the →host

DHCP is a protocol that provides dynamic configuration of IP addresses and associated information. The protocol supports use of IP addresses which are only available in limited number by a centralised management of the address assignment.

The participant logs on to a server with this service when it is switched on in a network for the first time. The server assigns a local free →IP address to the participant.

Diagnosis

During the diagnosis, the "state of health" of the device is checked. It is to be found out if and what faults are given in the device.

Depending on the device, the inputs and outputs can also be monitored for their correct function.
- wire break,
- short circuit,
- value outside range.

For diagnosis, configuration and log data can be used, created during the "normal" operation of the device.

The correct start of the system components is monitored during the initialisation and start phase. Errors are recorded in the log file.

For further diagnosis, self-tests can also be carried out.

DRAM

DRAM = **D**ynamic **R**andom **A**ccess **M**emory

Technology for an electronic memory module with random access (Random Access Memory, RAM). The memory element is a capacitor which is either charged or discharged. It becomes accessible via a switching transistor and is either read or overwritten with new contents. The memory contents are volatile: the stored information is lost in case of lacking operating voltage or too late restart.

E

EMC

EMC = **E**lectro **M**agnetic **C**ompatibility

According to the EC directive (2004/108/EEC) concerning electromagnetic compatibility (in short EMC directive) requirements are made for electrical and electronic apparatus, equipment, systems or components to operate satisfactorily in the existing electromagnetic environment. The devices must not interfere with their environment and must not be adversely influenced by external electromagnetic interference.

Ethernet

Ethernet is a widely used, manufacturer-independent technology which enables data transmission in the network at a speed of 10 or 100 million bits per second (Mbps). Ethernet belongs to the family of so-called "optimum data transmission" on a non exclusive transmission medium. The concept was developed in 1972 and specified as IEEE 802.3 in 1985.

F

FC

FC = flat cable
The yellow or black AS-i cable is meant.

FE – functional earth

Functional **e**arth is a reference potential which is not connected to protective earth or only connected when special measures are taken. The functional earth serves as equalisation of potential for an ungrounded installation (e.g. →SELV).

Fieldbus

A →bus for industrial applications: mechanically extremely robust and excellent data protection.

Firmware

System software, basic program in the device, virtually the operating system.

The firmware establishes the connection between the hardware of the device and the user software. This software is provided by the manufacturer of the controller as a part of the system and cannot be changed by the user.

Flash memory

Flash ROM (or flash EPROM or flash memory) combines the advantages of semiconductor memory and hard disks. Just like every other semiconductor memory the flash memory does not require moving parts. And the data is maintained after switch-off, similar to a hard disk.

The flash ROM evolved from the EEPROM (**E**lectrical **E**rasable and **P**rogrammable **R**ead-**O**nly **M**emory). The storage function of data in the flash ROM is identical to the EEPROM. Similar to a hard disk, the data are however written and deleted blockwise in data blocks up to 64, 128, 256, 1024, ... bytes at the same time.

Advantages of flash memories

- The stored data are maintained even if there is no supply voltage.
- Due to the absence of moving parts, flash is noiseless and insensitive to shocks and magnetic fields.
- In comparison to hard disks, flash memories have a very short access time. Read and write speed are virtually constant across the entire memory area.
- The memory size that can be obtained has no upper limit, due to the simple and space-saving arrangement of the storage cells.

Disadvantages of flash memories

- A storage cell can tolerate a limited number of write and delete processes:
  - Multi-level cells: typ. 10 000 cycles
  - Single level cells: typ. 100 000 cycles
- Given that a write process writes memory blocks of between 16 and 128 Kbytes at the same time, memory cells which require no change are used as well.

FMEA

FMEA = **F**ailure **M**ode and **E**ffects **A**nalysis

Method of reliability engineering, to find potential weak points. Within the framework of quality or security management, the FMEA is used preventively to prevent faults and increase the technical reliability.

FRAM

FRAM, or also FeRAM, means **Fe**rroelectric **R**andom **A**ccess **M**emory. The storage operation and erasing operation is carried out by a polarisation change in a ferroelectric layer.

Advantages of FRAM as compared to conventional read-only memories:

- non-volatile,
- compatible with common EEPROMs, but:
- access time approx. 100 ns,
- nearly unlimited access cycles possible.

G

Gateway

Gateway = access, coupler

Gateways enable connection of completely different systems. Gateways are used when two incompatible network types are to be connected by converting the protocol of one system to the protocol of the other system.

Example: connection between AS-i and higher-level fieldbus systems such as →Ethernet DP, →DeviceNet, Interbus-S or other interfaces, e.g. RS-485. The device includes an AS-i master which is directly coupled to the →host interface (e.g. →Ethernet DP slave).

Gateway transfer time

The time that is needed for the input data in the DP-RAM of the AS-i master to be copied into the output data of the netX, and vice versa. The distance from DP-RAM to DP-RAM is decisive.

GSD

Generic **S**tation **D**escription

Describes the interface to the device to be connected to the fieldbus.

You can find the current version of the GSD file on the **ifm** homepage:
→ www.ifm.com > select your country > [Service]

> [Download] > [Bus system AS-Interface]
e.g. for AC1375:
→ GSD file for SmartLink AC1375
→ download the file `ifm...07E5.gsd` (... = version)

GSDML

GSDML = **G**eneric **S**tation **D**escription **M**arkup **L**anguage

Description language which can describe the characteristics of a device family across several levels. In this XML scheme, as much as possible of the semantics of the →GSD was adopted.

H

HMI

HMI = **H**uman **M**achine **I**nterface

Host

The controller in the hierarchy above the AS-i master, e.g. a PLC or a processor.

I

I&M

I&M = **I**dentification **&** **M**aintenance

→ Profibus Profile Guidelines Part 1: Identification & Maintenance Functions

ID

ID = **Id**entifier

Name to differentiate the devices / participants connected to a system or the message packets transmitted between the participants.

Instructions

Superordinate word for one of the following terms:
installation instructions, data sheet, user information, operating instructions, device manual, installation information, online help, system manual, programming manual, etc.

Intended use

Use of a product in accordance with the information provided in the instructions for use.

IO-Link

Point-to-point connection between 2 devices. The following transmission is possible:
- binary signals or
- greater data fields for parameter setting.

More informations → www.io-link.com

IP address

IP = **I**nternet **P**rotocol

The IP address is a number which is necessary to clearly identify an internet participant. For the sake of clarity the number is written in 4 decimal values, e.g. 127.215.205.156.

J

Jitter

Jitter means a slight fluctuation in accuracy in the transmission cycle when transmitting digital signals. More generally, jitter in transmission technology means an abrupt and undesired change of the signal characteristics.

L

LAS

List of **A**ctive **S**laves

In this slave list the controllerE enters the slaves detected as active for this AS-i master.

LDS

List of **D**etected **S**laves

In this slave list the controller enters the slaves detected as present for this AS-i master.

LED

LED = **L**ight **E**mitting **D**iode

Light emitting diode, also called luminescent diode, an electronic element of high coloured luminosity at small volume with negligible power loss.

LFS

List of **F**ailed **S**laves = list of slaves with configuration errors

In this slave list the controller enters the slaves with a projection error on this AS-i master.

Link

A link is a cross-reference to another part in the document or to an external document.

LKCS

LKCS = **L**ist of **K**nown **C**TT **S**laves

In this list the CTT slaves (profile 7.4 and 7.5) which are indicated in the LDS and whose CTT configuration has already been read are entered. This list is independent of the LDS, LPS, LAS and LNACS.

LNACS

LNACS = **L**ist of **N**ot **A**ctivated **C**TT **S**laves

In this list, the CTT slaves (profiles 7.4 and 7.5) which have been detected as CTT slaves but not activated are entered. As soon as the slave is entered in the LAS, it is deleted from this list. These slaves only take part in the data exchange until the CTT configuration has been read.

LPS

List of **P**rojected **S**laves

In this slave list the controller enters the slaves projected for this AS-i master.

LSB

Least **S**ignificant **B**it/Byte

M

MAC-ID

MAC = **M**anufacturer‘s **A**ddress **C**ode
= manufacturer's serial number

→ID = **Id**entifier

Every network card has a MAC address, a clearly defined worldwide unique numerical code, more or less a kind of serial number. Such a MAC address is a sequence of 6 hexadecimal numbers, e.g. "00-0C-6E-D0-02-3F".

Master

Handles the complete organisation on the bus. The master decides on the bus access time and polls the →slaves cyclically.

Master-slave communication

AS-i strictly operates to the master-slave principle. The master polls all slaves one after the other in always the same order. Only one master per network line is allowed (→cyclical polling).

MBd

MegaBaud

Baud, abbrev.: Bd = unit for the data transmission speed. Do not confuse baud with "bits per second" (bps, bits/s). Baud indicates the number of changes of state (steps, cycles) per second over a transmission length. But it is not defined how many bits per step are transmitted. The name baud can be traced back to the French inventor J. M. Baudot whose code was used for telex machines.

1 MBd = 1024 x 1024 Bd = 1 048 576 Bd

MMI

→ HMI (→ page 233)

Modbus

The Modbus protocol is a communication protocol based on a →master/slave architecture and was generated by Modicon in 1979 for communication with its PLCs. In the industry, Modbus has become a de facto standard.

Modbus/TCP is based on →Ethernet TCP/IP. Modbus/TCP ports the protocol defined for the serial interface to TCP. The →IP address clearly identifies each device in a network. Therefore the slave address was used to identify one of several logical units (unit IDs) in a physical device. To do so, the extended IP addressing is used.

Example: 192.168.83.28.1 means unit ID 1 on IP address 192.168.83.28.

*) Modicon passed from AEG to the group Schneider in 1994.

MRAM

MRAM means **M**agnetoresistive **R**andom **A**ccess **M**emory. The information is stored by means of magnetic storage elements. The property of certain materials is used to change their electrical resistance when exposed to magnetic fields.

Advantages of MRAM as compared to conventional RAM memories:

- non volatile (like FRAM), but:
- access time only approx. 35 ns,
- unlimited number of access cycles possible.

MSB

Most **S**ignificant **B**it/Byte

O

Operating system

Basic program in the device, establishes the connection between the hardware of the device and the user software.

OSC

OSC = **O**nline **S**upport **C**enter
Help system in the device

OSSD

OSSD = **O**utput **S**ignal **S**witching **D**evice

= output signal of a switching device. Here: output signal of an AS-i safety monitor.

P

Password

In the menu [System Setup], menu item [Password] the handling can be restricted or enabled. When delivered, the device is in the user mode. By entering an invalid password (e.g. 1000) all menu items which can change settings are blocked.

PCCD

PCCD = **P**rojected **C**TT **C**onfiguration **D**ata

Configuration data for the 7.4 and 7.5 slaves stored in the device:
- Manufacturer ID,
- Vendor ID,
- Device ID,
- Device Group ID.

PCD

PCD = **P**rojected **C**onfiguration **D**ata

Configuration data stored in the device:
LPS and AS-i profile (IO, ID, ID1, ID2)

PDM

PDM = **P**rocess and **D**ialogue **M**odule

Device for communication of the operator with the machine / plant.

PELV

PELV = **P**rotective **E**xtra **L**ow **V**oltage

Functional extra low voltage with safe separation, grounded variant of SELV.

Extra low voltage with safe separation (grounded variant of SELV). The specification as PELV system to IEC 364-4-41 covers a measure to protect against direct and indirect contact with dangerous voltages by a "safe

separation" between primary and secondary side in the device (e.g. power supply to PELV specification).

For this reason no separate PE conductor is required in a PELV system. It is allowed to ground circuits and / or bodies in a PELV system.

Pictogram

Pictograms are figurative symbols which convey information by a simplified graphic representation.

→ Chapter What do the symbols and formats mean? (→ page 7)

PLC configuration

Part of the CoDeSys user interface.

► The programmer tells the programming system which hardware is to be programmed.

> CoDeSys loads the corresponding libraries.

> Reading and writing the peripheral states (inputs/outputs) is possible.

Polling

to poll = to count votes

The controller master fetches the data from every participant in the system successively:

1. Master calls participant 1.
2. Participant 1 replies with its current data (actual values).
3. Master transfers more data (target values) to participant 1, if needed.
4. Participant 1 acknowledges reception of the data.

etc. the same procedure for each further participant.

Cyclical polling: AS-i master cyclically polls the data of all →slaves in the bus (see above). The data is updated in the →master after max. 5 ms. If A/B slaves are used, the →cycle time can be extended to 10 ms.

Power-on delay time

The time required by the controller K6 from the application of the voltage supply until all of the following targets are reached:

- both AS-i networks have reached normal operation
- the master has read the configuration data of the CTTx slaves
- the field buses can use the gateway (optional)
- the PLC program was started (optional).

Process image

Process image is the status of the inputs and outputs the PLC operates with within one cycle.

- At the beginning of the cycle the PLC reads the conditions of all inputs into the process image.
  During the cycle the PLC cannot detect changes to the inputs.
- During the cycle the outputs are only changed virtually (in the process image).
- At the end of the cycle the PLC writes the virtual output states to the real outputs.

Profibus

PROFIBUS (**Pro**cess **Fi**eld **Bus**) is a standard for fieldbus communication in automation technology. There are three versions of PROFIBUS, DP being the one most widely used.

- PROFIBUS-DP (decentralised periphery) for the control of sensors and actuators by a central controller in manufacturing engineering and for networking of several controllers among each other. Data rates up to 12 Mbits/s on twisted two-wire cables and/or fibre optics are possible.
- PROFIBUS-PA (process automation) is used for the control of measurement devices by a process control system in process technology and is suited for hazardous areas (zones 0 and 1). Only a limited current flows on the bus cables in an intrinsically safe circuit so that even in case of a problem no explosive sparks can occur. A disadvantage of PROFIBUS-PA is the relatively slow data transfer rate of 31.25 Kbits/s.

More information → www.profibus.com (umbrella organisation)

Profinet

PROFINET (**Pro**cess **Fi**eld **Net**work) is the open Industrial Ethernet Standard of Profibus & Profinet International (PI) for automation. Profinet uses TCP/IP and IT standards, is real-time Ethernet compatible and enables the integration of fieldbus systems.

The Profinet concept has a modular design, so that the user can choose the functionality himself. This is basically different as regards the type of data exchange, to meet the requirements regarding the speed.

For Profinet, there are the two perspectives Profinet-CBA and Profinet-IO:

- Profinet-CBA (Component Based Automation) is intended for the component-based communication via TCP/IP and the real-time communication for real-time requirements in modular plant construction. Both ways of communication can be used in parallel.
- Profinet-IO has been created for real-time (RT) and synchronous communication IRT (IRT = isochronous real-time) with the decentralised periphery. The designations RT and IRT only describe the real-time characteristics in the communication within Profinet-IO.

More information → www.profibus.com (umbrella organisation)

R

Redundant

Redundancy is the presence of more than the necessary means so that a function unit performs a requested function or that data can represent information.

Several kinds of redundancy are distinguished:

- Functional redundancy aims at designing safety-related systems in multiple ways in parallel so that in the event of a failure of one component the others ensure the task.
- In addition it is tried to separate redundant systems from each other with regard to space. Thus the risk that they are affected by a common interference is minimised.
- Finally, components from different manufacturers are sometimes used to avoid that a systematic fault causes all redundant systems to fail (diverse redundancy).

The software of redundant systems should differ in the following aspects:

- specification (different teams),
- specification language,
- programming (different teams),
- programming language,
- compiler.

Remanent

Remanent data is protected against data loss in case of power failure.

The operating system for example automatically copies the remanent data to a flash memory as soon as the voltage supply falls below a critical value. If the voltage supply is available again, the operating system loads the remanent data back to the RAM memory.

The data in the RAM memory of a controller, however, is volatile and normally lost in case of power failure.

RTC

RTC = **R**eal **T**ime **C**lock

Provides (batter-backed) the current date and time. Frequent use for the storage of error message protocols.

RTS

RTS = **R**un **T**ime **S**ystem

Runtime systems are basic versions of applications. These minimum versions are supplied with certain products to meet the prerequisites for the execution of the actual product or to be able to look at or use results generated by this product on other processors: making available all routines required to execute a program in a programming language, e.g. interactions with the →operating system, memory requirements, error routines, inputs and outputs.

S

SD card

An SD memory card (short for **S**ecure **D**igital Memory Card) is a digital storage medium that operates to the principle of flash storage.

Self-test

Test program that actively tests components or devices. The program is started by the user and takes a certain time. The result is a test protocol (log file) which shows what was tested and if the result is positive or negative.

SELV

SELV = **S**afety **E**xtra **L**ow **V**oltage

Active parts of safety extra low voltage circuits must neither be connected to ground nor to protective wires of other circuits. They must be safely separated from active parts with higher voltage.

SELV circuit = secondary circuit (output voltage) which is rated and protected so that its voltages do not exceed a safe value in case of correct operation (of the power supply) or in case of a single fault (of the power supply).

SELV circuits are separated from the input voltage (mains voltage) by double or enhanced insulation. The voltage value must not exceed 60 V DC (or 42.4 V AC).

Single slave

→Slave whose address number may only occur once on the →master.

Slave

Passive participant on the bus, only replies on request of the →master. Slaves have a clearly defined and unique →address in the bus.

Slave configuration

The following terms need to be distinguished...
- AS-i projected configuration (PCD (→ page 235)),
- AS-i current configuration (CDI (→ page 230)),
- CTT projected configuration (PCCD (→ page 235)),
- CTT current configuration (CCDI (→ page 230)).

Symbols

Pictograms are figurative symbols which convey information by a simplified graphic representation.

→ Chapter What do the symbols and formats mean? (→ page 7)

System variable

Variable to which access can be made via IEC address or symbol name from the PLC.

T

Target

The target indicates the target system where the PLC program is to run. The target contains the files (drivers and if available specific help files) required for programming and parameter setting.

TCP

The **T**ransmission **C**ontrol **P**rotocol is part of the TCP/IP protocol family. Each TCP/IP data connection has a transmitter and a receiver. This principle is a connection-oriented data transmission. In the TCP/IP protocol family the TCP as the connection-oriented protocol assumes the task of data protection, data flow control and takes measures in the event of data loss. (compare: →UDP)

U

UDP

UDP (**U**ser **D**atagram **P**rotocol) is a minimal connectionless network protocol which belongs to the transport layer of the internet protocol family. The task of UDP is to ensure that data which is transmitted via the internet is passed to the right application.

At present network variables based on CAN and UDP are implemented. The values of the variables are automatically exchanged on the basis of broadcast messages. In UDP they are implemented as broadcast messages, in CAN as PDOs. These services are not confirmed by the protocol, i.e. it is not checked whether the message is received. Exchange of network variables corresponds to a "1 to n connection" (1 transmitter to n receivers).

Unit ID

→Modbus

Use, intended

Use of a product in accordance with the information provided in the instructions for use.

W

Watchdog

In general the term watchdog is used for a component of a system which watches the function of other components. If a possible malfunction is detected, this is either signalled or suitable program branchings are activated. The signal or branchings serve as a trigger for other co-operating system components to solve the problem.

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