PHOENIX CONTACT

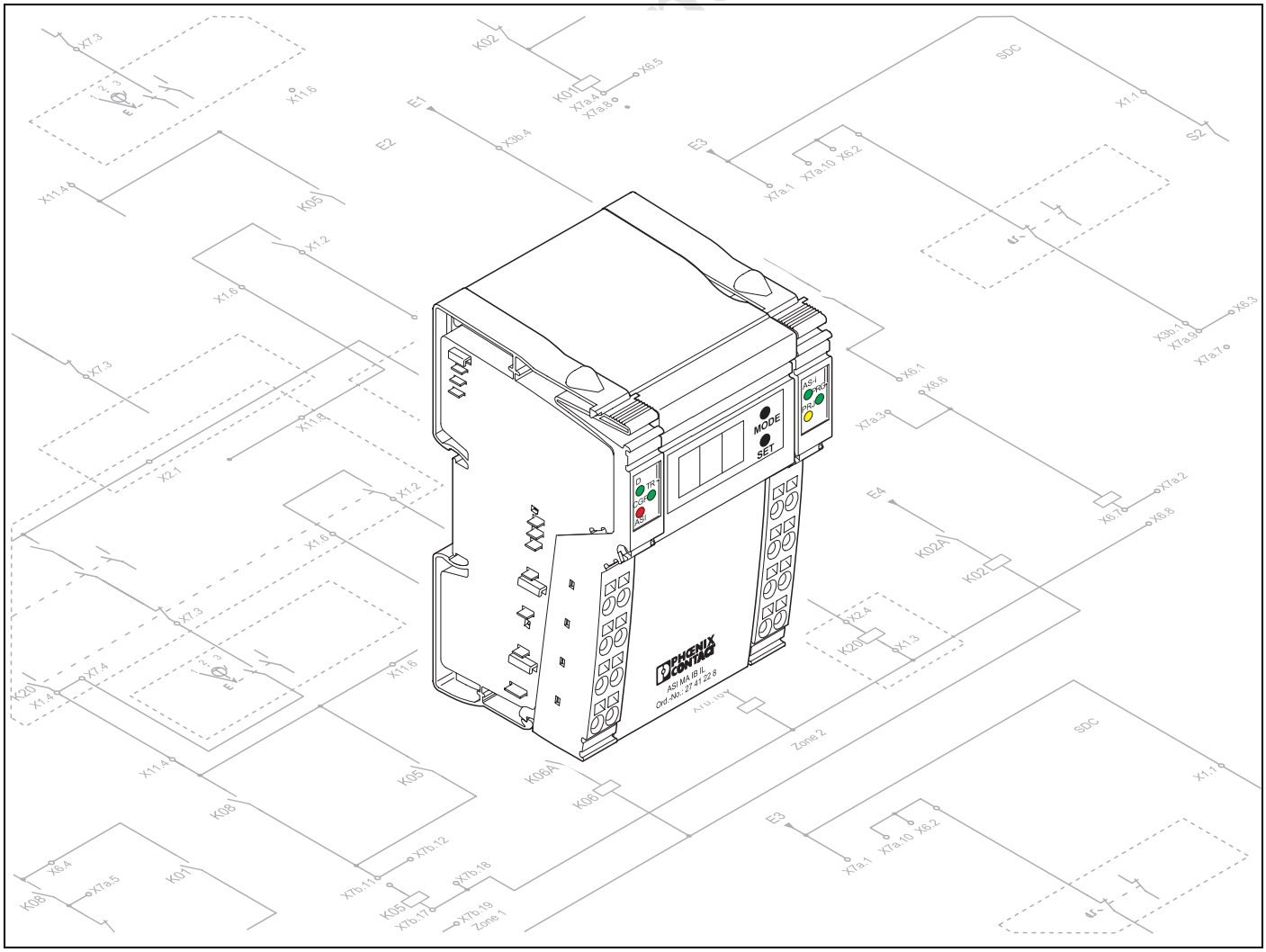
INNOVATION IN INTERFACE

User Manual

Configuring and Installing the
INTERBUS/AS-i Gateway

Designation: ASI DOC MA IB IL UM E

Order No: 27 41 40 6



AS-Interface

User Manual

Configuring and Installing the INTERBUS/AS-i Gateway

Designation:	ASI DOC MA IB IL UM E
Revision:	B
Order No.:	27 41 40 6

This manual is valid for:

ASI MA IB IL	Order No. 27 41 22 8

Please Observe the Following Notes:

In order to guarantee the safe use of your device, we recommend that you read this manual carefully. The following notes give you information on how to use this manual.

Qualifications of the User Group

The products described in this manual should be installed/operated/maintained only by electricians or persons instructed by them, who are familiar with applicable national standards. Phoenix Contact assumes no liability for damage to any products resulting from disregard of information contained in this manual.

We Are Interested in Your Opinion

We are constantly striving to improve the quality of our documents.

Should you have any suggestions or recommendations for improving the contents and layout of our documents, please send us your comments. Please use the fax form at the end of the manual for this purpose.

Statement of Legal Authority

Phoenix Contact reserves the right to make any technical changes that serve the purpose of technical progress.

Internet

You can find up-to-date information about products of Phoenix Contact on the internet under **www.phoenixcontact.com**.

Table of Contents

1 The Symbols Used

Warning

This symbol warns the user of possible danger. Failure to heed this warning can lead to personal injury or death and/or damage to equipment.

Attention

This symbol warns the user of a possible failure. Failure to heed this warning can lead to total failure of the equipment or any other connected equipment.

Note

This symbol gives the user important hints.

2 Safety

2.1 Intended Use

Warning

The protection of operating personnel and the system against possible danger is not guaranteed if the control interface unit is not operated in accordance with its intended use.
The device may only be operated by appropriately qualified personnel in accordance with this operating manual.

2.2 General Safety Information

Warning

Safety and correct functioning of the device cannot be guaranteed if any operation other than that described in this operation manual is performed.
The connecting of the equipment and any maintenance work to be carried out with voltage applied to the equipment must only be performed by appropriately qualified electrotechnical personnel.
In the case that a failure cannot be repaired, the device must be taken out of operation and kept from inadvertently put back into operation.
Repair work is to be carried out by the manufacturer only. Additions or modifications to the equipment are not allowed and void the warranty.

Note

The operator is responsible for the observance of local safety standards.

3 General Information

This operating instruction is for use with the following devices of the Phoenix Contact GmbH & Co.:

- AS-i/INTERBUS gateway ASI MA IB IL Inline order no. 2741228

The AS-i/INTERBUS gateways serve to connect the Actuator-Sensor-Interface to the INTERBUS. The Gateways act as a complete master for the AS-Interface and as a slave for INTERBUS.

Both gateways can be used in the same way. Commissioning, debugging and setting up of the AS-i parameters can be accomplished with the use of two push-buttons, the display and the LEDs directly on the device as with all AS-i masters of Phoenix Contact.

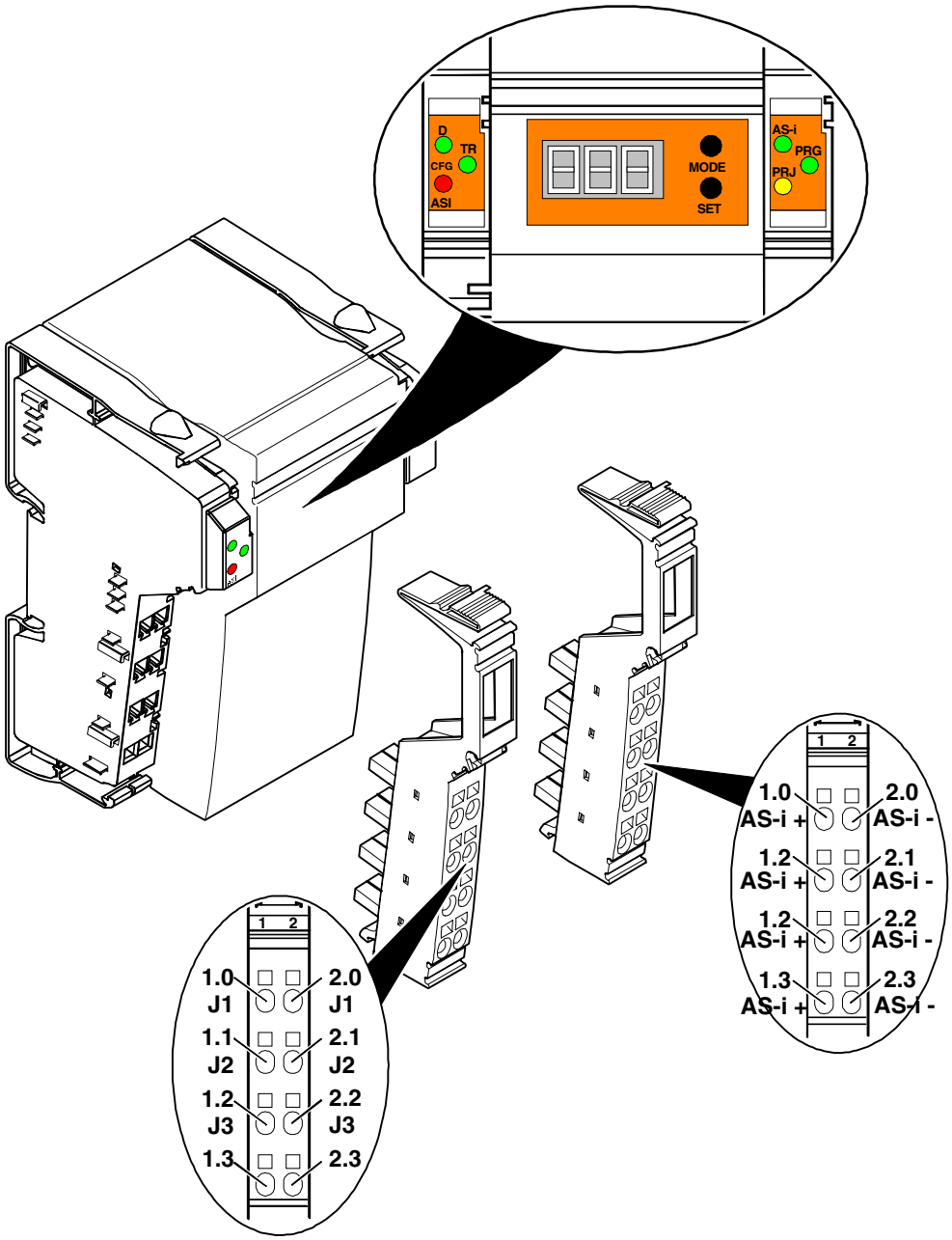
It is also possible to do the configuration of AS-interface with the AS-i Control Tools. Advanced diagnostics to detect occasional occuring errors and judge the quality of the AS-interface communication can be executed as well with the AS-i Control Tools.

The gateway transmits the AS-i I/O data and AS-i flags cyclically within 15 INTERBUS words of the process data channel. All AS-interface functions can be called up via PCP objects.

INTERBUS module error can be configured to be caused by AS-i configuration error or AS-i power failure.

4 Installation, Displays and Operating Keys

4.1 Module Installation



Attention

Please consult also the "INTERBUS Inline System Manual" to learn more about the Inline connection techniques (mounting terminals, connecting cables, logic power supply ...).

Please pay attention to the Inline grounding concept in particular!

4.1.1 Replacing Terminals

Warning

Do not replace terminals while power is connected!

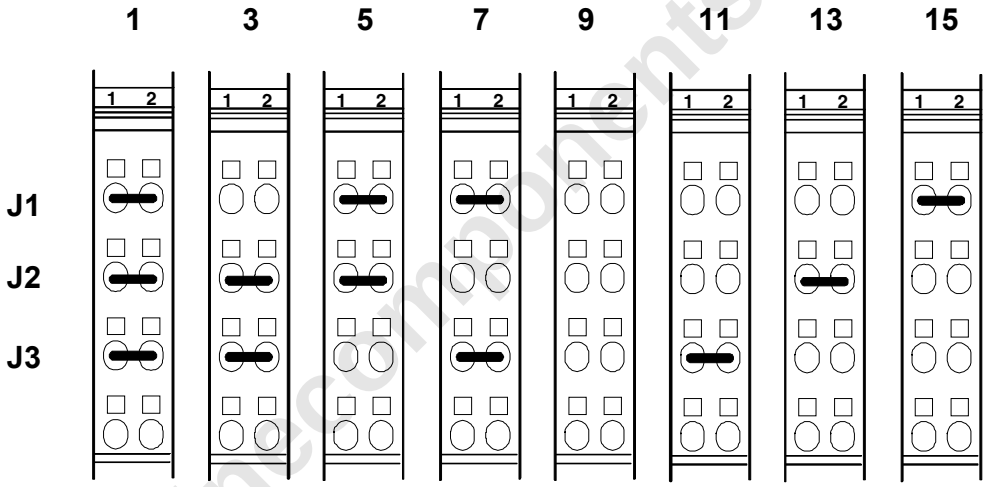
Before removing or mounting a terminal, disconnect power to the entire station! Make sure the entire station is reassembled before switching power back on.

4.1.2 Adjusting the Length of the Process Data

If the object 5FFB is 0 (state of delivery) the length of the process data is set by the J1... J3 on the **left** terminal block.

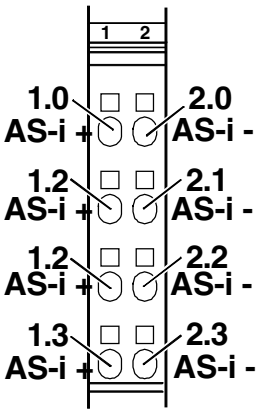
The jumpers have to be set as follows:
J1 between terminal 1.0 and 2.0
J2 between terminal 1.1 and 2.1
J3 between terminal 1.2 and 2.2

Length of the process data:

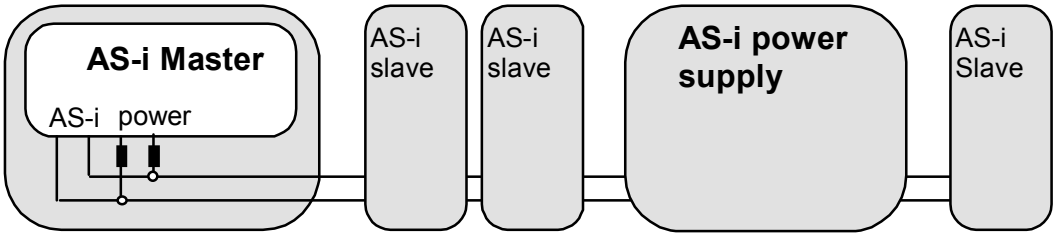


4.1.3 Connecting the AS-i Circuit

The AS-i circuit is connected to the **right** terminal block. AS-i + is connected to the terminals 1.0 - 1.3 and AS-i - to the terminals 2.0 - 2.3.



The power supply has to be an AS-i power supply that can be connected to the AS-i line at any place.An AS-i power supply has to be used which can be connected to the AS-i cable like all the other AS-i components at any place.



4.2 Display and Operating Elements

On the front panel of the AS-i/INTERBUS gateway are several light-emitting diodes, a three-digit seven-segment display and two push buttons to configure the gatway.

4.2.1 LEDs

D — LED (green).
on: INTERBUS is active
flashes (0,5 Hz): INTERBUS not active
flashes (2 Hz): INTERBUS active, peripheral fault
flashes (4 Hz): terminal in front of the module failed
off: no logic power supply, INTERBUS not active.
If this LED is on or flashes, the logic power supply is O.K.

TR — LED (green).
PCP-channel active.

CFG — LED (red).
Configuration error in the AS-i network. When this LED is alight, the seven-segment display indicates an AS-i address. This is the lowest AS-i address at which a configuration error has been detected, i.e. a higher AS-i address may appear when the error is rectified.

AS-i — LED (green).
Lights up when the operating voltage in the AS-i network is correctly applied.

PRG — LED (green).
Configuration mode, i.e. the addresses of the AS-i slaves can be modified directly on the AS-i/INTERBUS gateway and the actual configuration of the AS-i can be displayed. All connected slaves participate in the data exchange, whilst in the protected mode only the configured slaves are addressed and polled.

PRJ — LED (yellow).
Configuration mode, i.e. the addresses of the AS-i slaves can be modified directly on the AS-i/INTERBUS gateway and the actual con-

figuration of the AS-i can be displayed. All connected slaves participate in the data exchange, whilst in the protected mode only the configured slaves are addressed and polled.

4.2.2 Seven-Segment-Display

The seven-segment-display shows slave addresses, errors and operations modes. See also chapter 9.

4.2.3 Push-Buttons

The two push-buttons are:

MODE switches between configuration mode and protected mode; stores the actual configuration as projected configuration.

SET selection and setting of the address of an AS-i slave.

See chapter 5 for a detailed description.

5 Operating the AS-i/INTERBUS Gateway

5.1 Master Start-Up

After powering on, all segments of the figure display and all LEDs light up for approximately one second (self-test). Afterwards, the LEDs display the condition of their respective flags. The figure display shows the condition of the master:

OFP Off-line Phase
The AS-i master initializes - there is no data communication on the AS-i.

If the AS-i circuit is insufficiently powered ("AS-i" does not light up), the master remains in the off-line phase.

SEA Detection Phase (search)
Start of the start-up phase, where the system looks for slaves located on the AS-i. The master remains in the detection phase until it finds at least one slave.

42[1] Activation Phase
Condition at the end of the start-up operation where the parameters are transmitted to all connected and recognized slaves. This enables access to the AS-i slaves' data connections.

43[2] Start of Normal Operation
In normal operation the AS-i master can exchange data with all active slaves. It transmits management messages and looks for and activates newly connected slaves. During normal operation, the system keeps the maximum cycle time of 5 milliseconds.

5.2 Configuration Mode

The configuration mode serves to configure the AS-i circuit.

In the configuration mode, all recognized slaves are activated even when the desired and actual configurations do not match.

Pressing the "MODE" button for at least five seconds switches the gateway to configuration mode. While in configuration mode, the yellow "PRJ" LED lights up.

The system then displays one after the other all detected slaves at a speed of two per second. If the display is empty, no slaves were detached on the AS-i circuit.

1. Activation phase and the start of normal operation maybe so short that the numbers can not be seen in the display.
2. Activation phase and the start of normal operation maybe so short that the numbers can not be seen in the display.

In configuration mode, all recognized slaves are activated except of slave zero. The AS-i master is in normal operation. There is data exchange between the AS-i master and all AS-i slaves detected by the master regardless of whether the detected AS-i slaves were projected before.

Attention

When delivered the device is in configuration mode.

5.3 Protected Operating Mode

Note

In contrast with the configuration mode in the protected mode there is only data exchange between the AS-i master and the projected AS-i slaves.

5.3.1 Switching to Protected Operating Mode

The configuration mode can be left by pressing the “MODE” button.

Pressing the button shortly:

Exits the configuration mode without projecting the current AS-i configuration.

Pressing the button for more than five seconds:

Exits the configuration mode and projects the actual AS-i configuration. Simultaneously the actual AS-i configuration is stored as nominal configuration in the EEPROM.

Note

If the system detects an AS-i slave with address zero on the AS-i, it can not leave the configuration mode.

In the protected operating mode, only AS-i slaves that are projected and whose actual configurations match the nominal configurations will be activated.

5.3.2 Configuration Errors in Protected Operating Mode

As long as there is no configuration error, the numeric display is turned off while in protected operating mode. Otherwise, the address with a faulty assignment is displayed. A faulty assignment occurs when a slave has been recognized or projected but cannot be activated.

If there are more than one faulty assignments the one that was first detected is displayed. Pressing the “SET” button shortly displays the next higher faulty address.

Shortly appearing configuration errors are stored in the device (advanced AS-i diagnosis). The last error that occurred can be displayed by pressing the set button. If a short AS-i power failure is responsible for the configuration error the display shows a “39”.

5.4 Assigning an AS-i Address in Configuration Mode

To assign a slave with address unequal zero to another address unequal zero, you have to follow the instructions first in chapter 5.4.2 and then chapter 5.4.1 one after the other.

5.4.1 Assigning a Slave Address

(assigning an available address to a slave with address zero)

In configuration mode, the addresses of all detected slaves are displayed one after the other. To display the next higher available operating address, press the “SET” button shortly. Each time you press the “SET” button, the next available address is displayed.

Choose the displayed address as your target address by pressing the “SET” button for more than five seconds. The address display blinks. The master is ready for programming; pressing the “SET” button again addresses the connected slave with address zero to the target (blinking address).

Any errors will be displayed by their error codes according to chapter 9. Otherwise, the detected slaves are displayed again as described in chapter 5.2..

Note

Only slaves with address 0 can get a new address by the master.

Attention

There must not be two AS-i slaves with the same adrress on the AS-i circuit.

5.4.2 Erasing the Slave Address

(assigning address zero to a detected slave)

In configuration mode, the addresses of all recognized slaves are displayed one after the other. By pressing and releasing the “SET” button, the master displays the next available address. If you press the button for more than five seconds while the address of a detected slave is displayed, this slave will get the address zero and the display shows “00”.

When you release the button, the display continues to display the detected slaves.

5.5 Programming the Address in Case of Configuration Errors

5.5.1 Automatic Address Assignment

Note

One of AS-i's great advantages is the automatic address assignment. If a slave fails, it can be replaced by one of the same type with address zero. The master will detect the replacement and automatically addresses the new slave with the address of the faulty one.

For automatic programming to work, some requirements must be met:

1. The AS-i master must be in the protected operating mode.
2. The "Auto_Address_Assign"[1] release flag must be set.
3. Only one of the projected slaves may not be detected.

If these requirements are met, the AS-i master's "**PRG**" LED lights up and a slave with address zero will be automatically assigned to the operating address of the missing slave. The "Automatic Address Assignment" can be activated and deactivated via the software "AS-i Control Tools". .

Attention

If the two slaves have different configuration data, i.e. are not of the same type as far as AS-i is concerned, the automatic address assignment will not be carried out.

Note

Only slaves with address 0 can get a new address by the master.

5.5.2 Manual Address Assignment

Note

If several slaves fail, they cannot be replaced automatically by the AS-i master. Then these addresses have to be set manually. If this should not be done via the host interface (using the AS-i Control Tools) or with a hand held addressing device, the slave addresses can also be changed with the help of the push buttons and the figure display of the device.

In protected operating mode, wrong assignments are displayed as errors (see chapter 5.3). By pressing the "SET" button, you can display all faulty assignments one after the other. By pressing the "SET" button for more than five seconds, you can select the currently displayed address as a potential target address, and the display starts to blink.

If the faulty slave was previously replaced by a slave with address zero, the new slave can now be programmed for the blinking address by pressing the "SET" key

1. By deletion of flag "Auto_prog" the user can close "automatic addressing".

again. As a requirement, the new slave's configuration data must match the configuration data for the blinking address.

After the address has been successfully set, the next faulty assignment is displayed and the address assignment can begin from the start. Otherwise, the system displays an error code (chapter 9). When all faulty assignments are eliminated the display is empty.

5.6 Error Messages

The system displays error codes for error messages that do not point to faulty assignments on the AS-i circuit. The code numbers are larger than 50 and are therefore outside the slave address range. These codes are described in the appendix, chapter 9.

6 Advanced Diagnostics for AS-i Masters

The advanced AS-i diagnostics serve to locate occasionally occurring errors and to judge the quality of data transmission on AS-i without additional diagnostics tools.

The "AS-i Control Tools" (software for the comfortable commissioning of the AS-Interface and the programming of AS-i Control) support the operation of the advanced diagnostics (LCS, error counters and LOS).

6.1 List of Corrupted AS-i Slaves (*LCS*)

To locate occasionally occurring short-time configuration errors the AS-i masters with advanced diagnostics manage beside the list of projected slaves (*LPS*), the list of detected slaves (*LDS*) and the list of activated slaves (*LAS*) a forth list, the **list of corrupted slaves (*LCS*)**. This list contains entries of all AS-i slaves which were responsible for at least one configuration error since powering up the AS-i master or reading the list. Short-time AS-i power failures are represented in the *LCS* at the position of AS-i slave with address 0.

Note

With every read access the LCS will be deleted.

Note

The last short-time configuration error can also be displayed on the AS-i Master:
Pressing the “SET” button of the AS-i master shows the AS-i slave which was responsible for the last short-time configuration error. If there was a short-time AS-i power failure the display shows “39” after pressing the “SET” button.
This function is only available if device is in the normal operation mode of the protected mode (display empty) or in the off-line-phase.

6.2 Protocol Analysis: Counters of Corrupted Data Telegrams

The AS-i master with advanced diagnostics has a counter of telegram repetitions for each AS-i slave, which is increased everytime there is a corrupted data telegram. This makes possible to judge the quality of the AS-i network, even if only a few corrupted telegrams occured and the AS-i slave did not cause any configuration errors.

Note

The counter values can be read via the host interface and will be deleted with every read access. The counter value is limited to 254. 255 means counter overflow.

6.3 Off-line Phase on Configuration Errors (LOS)

The AS-i masters with advanced diagnostics offer the possibility to put themselves into the off-line Phase when a configuration error on the AS-Interface occurs. In this way the security of the application can be ensured. The reaction to a configuration error is very fast and the host can be relieved from this task. If there are any problems on the AS-i network, the AS-interface can be switched to a secure state.

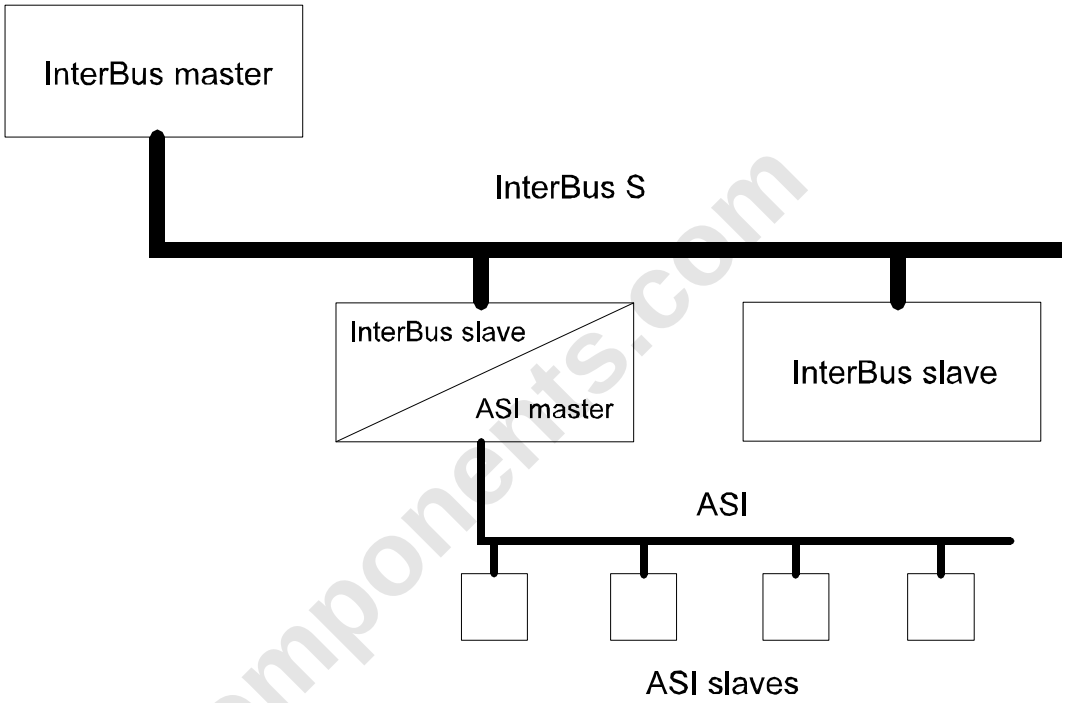
There are two different ways to parameterize the AS-i master for this feature:

- Every configuration error during normal operation in protected mode releases the off-line phase.
- For each slave address can be chosen whether a configuration error on this address will release the off-line phase or not. This information is stored in the List of Off-line Slaves (*LOS*).
  The user himself can decide how the system reacts to a configuration error on the AS-Interface. The AS-i master can release the off-line phase in critical situations, i. e. only with certain slave addresses, while in less critical situations (if one of the other AS-i slaves have a configuration error) only the error message configuration error is sent to the host, but AS-i is still running.

7 AS-i/INTERBUS Gateway

The primary task of the AS-i/INTERBUS gateway is to transfer bits from INTERBUS to the AS-i slaves (actuators) and to transfer bits from the AS-i to INTERBUS.

On the one hand, the AS-i/INTERBUS gateway is controlled by the INTERBUS master, i. e. it is an INTERBUS slave. On the other hand, it is the AS-i master, i. e. it monitors the AS-i network connected to it and controls all processes on it.



The processes on the two sides run independently of one another:

- The information from the process data channel on INTERBUS is temporarily stored in the AS-i/INTERBUS gateway until it can be transferred to the appropriate AS-i slave;
- The most recent available information from all the AS-i slaves is forwarded in an INTERBUS cycle via the process data channel to the INTERBUS master.

The maximum delay between INTERBUS master and AS-i slave is determined by the cycle time for the AS-i and the cycle time of INTERBUS.

7.1 Information Exchange over INTERBUS

The AS-i/INTERBUS gateway uses according to the configuration 16-bit words on INTERBUS:

- One word is used for the PCP (Peripherals Communication Protocol) through which the AS-i/INTERBUS gateway is programmed and queried; the PCP word does not appear in the process image of the PLC. The INTERBUS master automatically masks out this word.
- One word is used as the control word. The INTERBUS master can use this to interrupt data transmission in the AS-i network.

- The control word is replaced by the status word in the read cycle. The status word supplies status information to the INTERBUS master.
- 14 words (224 bits) constitute the fast process data channel. Here, bits are exchanged directly with the AS-i, so that four bits are available for altogether 55 AS-i slaves (address 0 is reserved for special tasks).

PCP (1 word)	Control word	Process Data (8 words)

Note

For the assignment of the (Word.Bit) or (Byte.Bit) view to the user set control or computer system, please refer to data sheet DB GB IBS SYS ADDRESS, Order No. 90 00 99 0.

7.1.1 Process Data Channel

The process data channel transfers logical states directly between the programmable logic controller (PLC) and the digital actuators and sensors on the AS-i. INTERBUS and AS-i are thus invisible for machine programming, i. e. there is no difference with conventional parallel wiring for the INTERBUS master (controller).

The images of the sensors and actuators in the PLC are as follows:

1st word

				slave 1 / 1A				slave 2 / 2A				slave 3 / 3A			
X	X	X	X	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
bit 15															bit 0

2nd word

slave 4 / 4A				slave 5 / 5A				slave 6 / 6A				slave 7 / 7A			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
bit 15															bit 0

...

...

7th word

slave 24 / 24A				slave 25 / 25A				slave 26 / 26A				slave 27 / 27A			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
Bit 15															Bit 0

8th word

slave 28 / 28A				slave 29 / 29A				slave 30 / 30A				slave 31 / 31A			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
Bit 15															Bit 0

9th word

				slave 1B				slave 2B				slave 3B			
X	X	X	X	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
Bit 15															Bit 0

...

...

14th word

slave 20B				slave 21B				slave 22B				slave 23B			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
Bit 15															Bit 0

The data for the slaves 24B to 31B can not be displayed because of the limited length of the process data channel. This data can only be accessed via the PCP-channel.

AS-i allows the use of a bit position for both input and output purposes. As a rule, AS-i slaves offer four inputs and outputs, each of which has its own bit position, e.g.:

slave n			
input	input	output	output
bit 15			bit 12

An AS-i slave uses its bits of the process data word as input or output data.

The order of the slaves on INTERBUS can be programmed in the AS-i/INTERBUS gateway. It is not possible to access the data for slave 0, as this address is reserved for configuration mode.

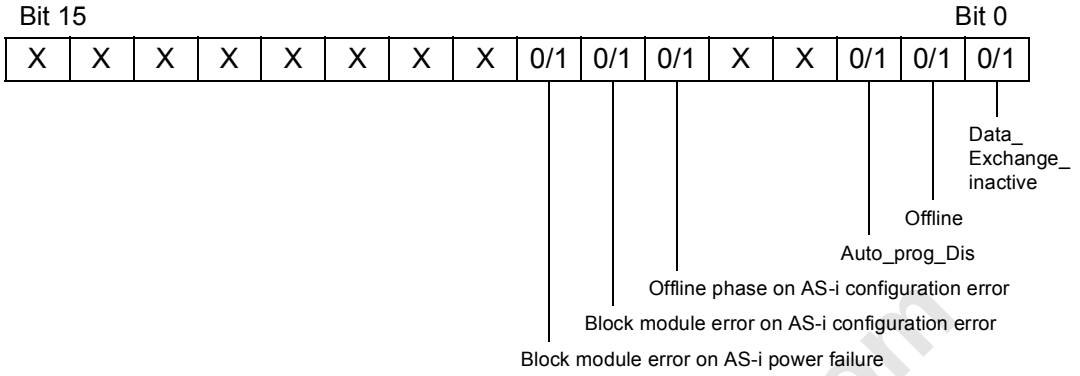
7.1.2 Control Word and Status Word

The INTERBUS master can use the control word to control the AS-i/INTERBUS gateway. The status word indicates the current state of the AS-i/INTERBUS gateway to the INTERBUS master.

Control word and status word are transmitted with each cycle of INTERBUS, just like the data on the process data channel.

Control word

Bit assignment in the control word for the AS-i/INTERBUS gateway (bit set: active, bit reset: off):



Controling the AS-i master with the bits 0, 1 and 2 is only possible if the PCP-object 5FD8 (out-mode) = FALSE.

Data_Exchange_Inactive
: Data exchange in the AS-i network is interrupted but continued again immediately after the bit was set to 0.

Offline
: All AS-i slaves are reset. No communication is taking place in the AS-i network. The AS-i network is re-initialized when this bit is set to 0 again.

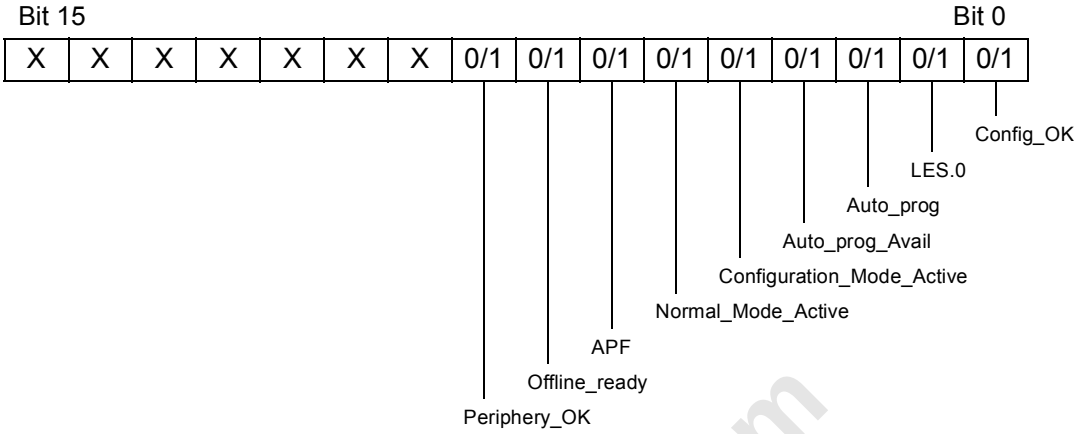
Auto_Prog_Disable
: Disables the possibility of automatic addressing.

Offline phase on configuration error
: If this bit is set and the AS-i master is in normal operation mode of the protected mode every configuration error releases the offline phase.
If this bit is 0, the PCP-object 5FDB (offline-slv) determines for each slave address individually wether a configuration error releases the offline phase.
A configuration error is both the case of a projected slave with which data exchange is not possible and the case of a supernumerary slave.
Independent of the access to this function (PCP or process data) the acknowledgement is both possible by the process data (falling edge on bit 5 of the control word) and by PCP (every writing access to the object 5FDB).

Block module error on AS-i configuration error
: If this bit is set the module error "AS-i configuration error" is blocked
If this bit is 0 the blocking depends on the PCP-object 5FDA (stat-err).

Block module error on AS-i power failure
: If this bit is set the module error "AS-i power failure" is blocked
If this bit is 0 the blocking depends on the PCP-object 5FDA (stat-err).

Status word



Config_OK

The desired configuration of the AS-i network coincides with the actual configuration, i. e. all parts of the AS-i are working and are correctly projected.

LDS.0 (list of detected slaves)

A slave with address 0 is connected to the AS-i.

Auto_Prog

Automatic addressing of a slave is possible.

Auto_Prog_Avail

The current error can be rectified by automatic programming. This state may occur, for instance, if precisely one slave is missing. This is a typical case for a field repair.

Configuration_Mode_Active

The AS-i/INTERBUS gateway is in configuration mode.

Normal_Mode_Active

The AS-i/INTERBUS gateway is in normal mode, the AS-i cycle is running.

APF

Voltage drop in the AS-i. In this event, the AS-i/INTERBUS gateway re-initializes all AS-i slaves. This is necessary as the slaves are supplied with their operating voltage through the AS-i. See “Offline ready”.

Offline_Ready

After switch-on, when the INTERBUS master has reset the AS-i/INTERBUS gateway through the control word and, following a voltage drop on the AS-i, the AS-i/INTERBUS gateway requires some time to initialize and check the AS-i. This signal is only active on completion of this phase.

Periphery_OK

This bit is set if none of the connected AS-i slaves shows a peripheral fault.

7.1.3 Parameter Data Channel

The parameter data channel allows data transmission in a more flexible form than does the process data channel. Individual AS-i slaves can be separately controlled or polled through this channel. Its most important task, however, is command

transmission. The AS-i/INTERBUS gateway operates in a pure server mode in this case, i. e. it understands certain commands the client can send. The client is always the INTERBUS master. Data transmission via the PCP channel can require a number of words per command. These words are sent in consecutive cycles of INTERBUS.

7.2 INTERBUS Interface

The AS-i/INTERBUS gateway communicates with the INTERBUS master in three ways, as described in section 3.1. In total, the AS-i/INTERBUS gateway occupies according to the configuration 16 words on INTERBUS, the location of which in the interface board or the controller board of the INTERBUS master is a consequence of the INTERBUS cabling.

The process data channel occupies 16 words (process data channel plus control and status word) as described in see chapter 7.1.2 and 7.1.3. The PLC or similar can address the sensors and actuators through this channel as if they were connected conventionally with parallel wiring.

The INTERBUS master and AS-i/INTERBUS gateway communicate with each other on a simple, rapid basis using the control word and data word. See chapter 7.1.3 for details.

Following functions can executed via PCP:

- Setting the parameters for AS-i slaves and reading their configuration data;
- Configuring AS-i slaves, i. e. storing the desired state of the AS-i network in the AS-i/INTERBUS gateway;
- Reading the stored data;
- Setting the operating mode (configuration mode, protected mode);
- Modifying the operating address of an AS-i slave;
- Reading the current configuration of the AS-i network;
- Reading the advanced diagnosis data;
- Reading and writing analog data.

Naturally, the gateway has all the functions necessary for its tasks as INTERBUS slave and INTERBUS server.

7.2.1 Basic Data

The basic INTERBUS data for the AS-i/INTERBUS gateway are shown in following tables, where xxd = decimal number and xxh means hexadecimal number.

The most important data of the AS-i/INTERBUS gateway for the programmer	
ID code	223d /DFh (INTERBUS Inline)
Input address area	48 - 240 bits (adjustable in 32 bit steps)
Output address area	48 - 240 bits (adjustable in 32 bit steps)
PCP address area	1 word
Register length	2 / 4 / 6 / 8 / 10 / 12 / 14 / 16 words (depending on the length of the process data)
Module error message (E) when the following occurs:	AS-i configuration error / AS-i power fail

Identification of the AS-i/INTERBUS gateway as a virtual field device (VFD)			
VFD attribute	Assignment	Data type	Comment
Vendor name	Phoenix Contact	Visible string	
Model name	ASI/IBS gateway	Visible string	
Revision	1.02	Visible string	
Profile	0	Octet string	The gateway does not correspond to a profile. However, it does use INTERBUS sensor/actuator profile conventions

7.2.2 PCP Services

The AS-i/INTERBUS gateway provides the following PCP services:

INTERBUS communications services of the AS-i/INTERBUS gateway			
Service	**Functions group**	**Client/Server**	**Confirmed/Unconfirmed**
Initiate	Administration	Server	confirmed
Abort	Administration	Client/Server	unconfirmed
Reject	Administration	Client/Server	unconfirmed
Status	Administration	Server	confirmed
Identify	Administration	Server	confirmed
Get-OV (long)	Administration	Server	confirmed
Write	Application	Server	confirmed
Read	Application	Server	confirmed

The INTERBUS client can use the READ service to read communication objects of the AS-i/INTERBUS gateway, with the WRITE service it can store it in the AS-i/INTERBUS gateway. As a server, the AS-i/INTERBUS gateway cannot initiate any read or write access.

The AS-i/INTERBUS gateway can only implement a communications relationship (PMS connection). If the INTERBUS master wishes to transmit data continuously

over the process data channel, it must continuously request the data. This should, however, rarely be necessary as the AS-i data is transmitted over the process data channel.

Further information regarding the services may be found in the INTERBUS literature.

7.2.3 Provision of Access

The AS-i/INTERBUS gateway supports access rights to communications objects, see Appendix.

7.2.4 Static PMS Data Types

The AS-i/INTERBUS gateway uses only a small number of the standardized data types and no freely defined data types:

Supported static data types The remaining standard data types shall be assigned a zero object	
Index	**Standardized PMS data type**
01	boolean
03	16 bit signed integer
05	8 bit unsigned integer
10	octet string

Description of the objects in the data type structure (DS) of the static object dictionary for the AS-i/INTERBUS gateway				
Index	**Object code**	**Number of Elements**	**Data-Type-Index**	**Length**
40h Read_stored_data	DS	3	octet string octet string octet string	31 16 4
41h Configure_slave	DS	2	octet string octet string	1 1
43h Read_Config_data	DS	2	octet string octet string	32 4
44h Read_parameter	DS	2	octet string octet string	16 4
45h Modify_operating_ address	DS	2	octet string octet string	1 1
46h input_data	DS	3	octet string octet string octet string	16 4 1
47h command call	DS	2	octet string octet string	1 1
48h Advanced Diagno- sis	DS	2	octet string octet string	32 4
49h block module errors	DS	2	bool bool	1 1
4Ah Analog value	DS	4	16 bit integer 16 bit integer 16 bit integer 16 bit integer	2 2 2 2

See chapter 13.3 for a description of the data structures.

The AS-i/INTERBUS gateway uses the following data objects which do not change during communications.

Communication type objects and data types:

Communication object	Index	Obj. type	Data type (length)	Content (length)
List of projected slaves (LPS)	5F50	simple variable	octet string (8)	LPS (1*62)
Configuration mode	5F51	simple variable	boolean	(true) - configuration mode (false) - protected mode
Parameterize_slave$_i$ (62 COs)	5F52-5F8F	simple variable	octet string (1)	Parameters for slave$_i$ (1*4)
Store_actual_parameters	5F90	simple variable	boolean	Store actual parameters (true) or not (false)
Store_actual_configuration	5F91	simple variable	boolean	Store actual configuration (true) or not (false)
Output data	5F92	simple variable	octet string (31)	Field of output data FOD (62*4)
Read_stored_data	5F93	record	octet string (124) octet string (31) octet string (8)	Field of stored conf. data (62*16) Field of stored parameters (62*4) List of projected slaves (LPS) (1*62)
Configure_slave$_i$ (62 COs)	5F94-5FD1	record	octet string (2) octet string (1)	Store configuration data of slave$_i$ (1*16) Store parameters of slave$_i$ (1*4)
Data transfer	5FD2	record	boolean boolean boolean	Set/reset offline flag Set/reset DA flag Set/reset Auto_Prog_Disable
Read_config_data	5FD3	record	octet string (126) octet string (8)	Field of the configuration data images (63*16) List of detected slaves (LDS) (1*63)
Read_parameters	5FD4	record	octet string (31) octet string (8)	Field of param. (62*4) List of active slaves (LAS) (1*62)
Modify operating address	5FD5	record	octet string (1) octet string (1)	old address new address

Communication object	Index	Obj. type	Data type (length)	Content (length)
Input data	5FD6	record	octet string (31) octet string (8) octet string (2)	Input data (62*4) List of detected slaves (LDS) (1*62) execution control flags) (1*16)
Command call	5FD7	record	octet string (1) octet string (1)	slave address command
Enable process output data	5FD8	simple variable	boolean	Set/reset PD/PCP output data (false/ true = PD/PCP transmission)
Read and delete advanced diagnosis data	5FD9	record	octet string (63) octet string (8)	Field of error counters (63*8) List of corrupted slaves (LCS) (1*63)
Block the module errors	5FDA	record	boolean boolean	Block error message AS-i power failure Block error message AS-i configuration error
LOS	5FDB	simple variable	octet string (8)	LOS (1*62)
Analog output data (31 COs)	5FDC-5FFA	record	16 bit integer 16 bit integer 16 bit integer 16 bit integer	analog channel 0 analog channel 1 analog channel 2 analog channel 3
INTERBUS length	5FFB	simple variable		IB length
List of peripheral faults (LPF)	5FFC	simple variable	octet string (8)	LPF (1*62)
Analog input data (31 COs)	5FFD-601B	record	16 bit integer 16 bit integer 16 bit integer 16 bit integer	analog channel 0 analog channel 1 analog channel 2 analog channel 3

See chapter 13.3 for a description of the data structures.

The Static Object Dictionary (SOD) specifies all the object types that are defined before the start of any communication and do not change during operation. It does not specify in which bit of the content of a communications object (CO) what information is stored.

The AS-i/INTERBUS gateway uses the following simple variable types of communications objects.

Communication objects of the simple variable type:

Index (CO)	5F50 List of projected slaves (LPS)	5F51 Configuration mode	5F52-5F8F Parameterize_slave$_i$	5F90 Store_actual_parameters	5F91 Store_actual_configuration	5F92 Output data
Object code	simple variable					
Data type index	10	01	10	01	01	10
Length	8	1	1	1	1	31
Password	0	0	0	0		0
Access groups	0	0	0	0	0	0
Access-rights	Wa					
Local address	Implementation dependent					
Variable name	no entry					
Extension	no entry					

See chapter 13.3 for a description of the data structures.

Communication object	Index	Content	Access	Process data imaging
Read_stored_data (1 CO)	5F93	Stored configuration data field Stored parameters field List of projected slaves (LPS)	read read read	not possible not possible not possible
Configure_slave$_i$ (62 COs)	5F94-5FD1	Stored configuration data for slave$_i$ Stored parameters for slave$_i$	write write	not possible not possible
List of projected slaves (LPS, 1 CO)	5F50	LPS	write	not possible
Configuration mode (1 CO)	5F51	AS-i master operating mode	write	not possible
Read_stored_data (1 CO)	5FD3	Configuration data images field List of detected slaves (LDS)	read read	not possible not possible
Read_parameters (1 CO)	5FD4	Parameters field List of active slaves (LAS)	read read	not possible not possible
Parameterize_slave$_i$ (62 COs)	5F52-5F8F	Parameters for slave$_i$	write	not possible
Store_actual_parameters (1 CO)	5F90	Store_actual_parameters (true) or not (false)	write	not possible
Store_actual_configuration (1 CO)	5F91	Store_actual_configuration (true) or not (false)	write	not possible
Modify_operating_address (1 CO))	5FD5	Old slave address/new slave address	write	not possible
Input data (1 CO)	5FD6	Input data field (FID) List of detected slaves (LDS) execution control flags	read read read	possible not possible possible

See chapter 13.3 for a description of the data structures.

Object description of the AS-i/INTERBUS gateway communication objects:

Index (CO)	5F93 Read_ stored_ data	5F94-5FD1 Configure_ $slave_i$	5FD3 Read_con- figuration_ data	5FD4 Read_ parameters	5FD5 Modify_ operating_ address	5FD6 Input data
Object code	record					
Data type index	40h	41h	43h	44h	45h	46h
Password	0	0	0	0		0
Access groups	0	0	0	0	0	0
Access rights	Ra	Wa	Ra	Ra	Wa	Ra
Variable name	no entry					
Extension	no entry					
Local address (1)	implementation dependent					
Local address (2)	implementation dependent					
Local address (3)	implemen- tation dependent	no entry	no entry	no entry	no entry	implemen- tation dependent

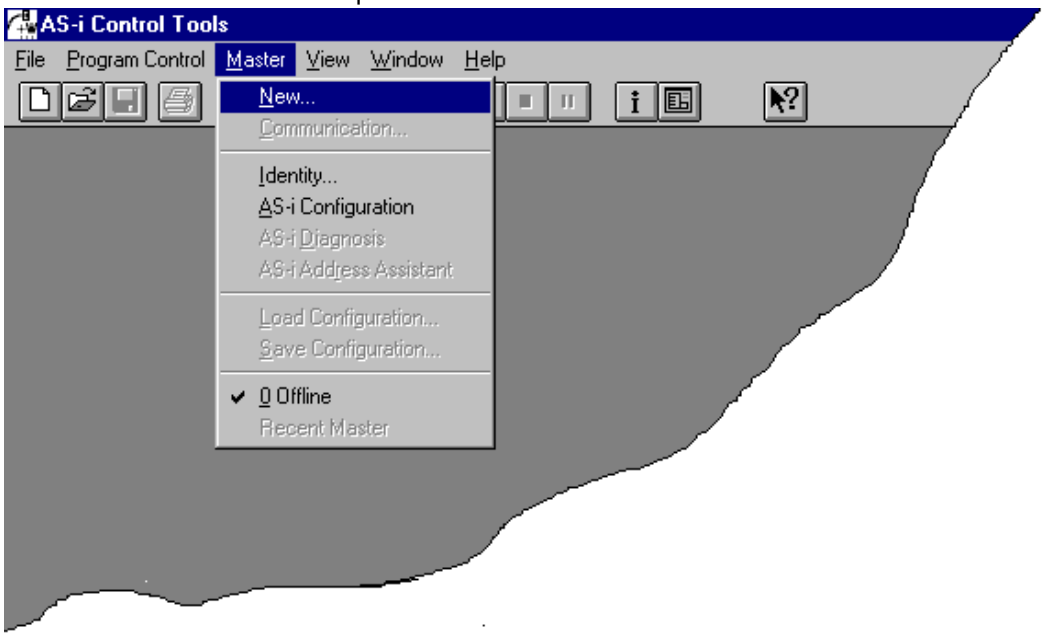
See chapter 13.3 for a description of the data structures.

8 Commissioning Tools and Accessories

The AS-i circuit on the AS-i/INTERBUS Gateway can be put into operation with the comfortable Windows software "AS-i Control Tools" (included on the CMD installation CD).

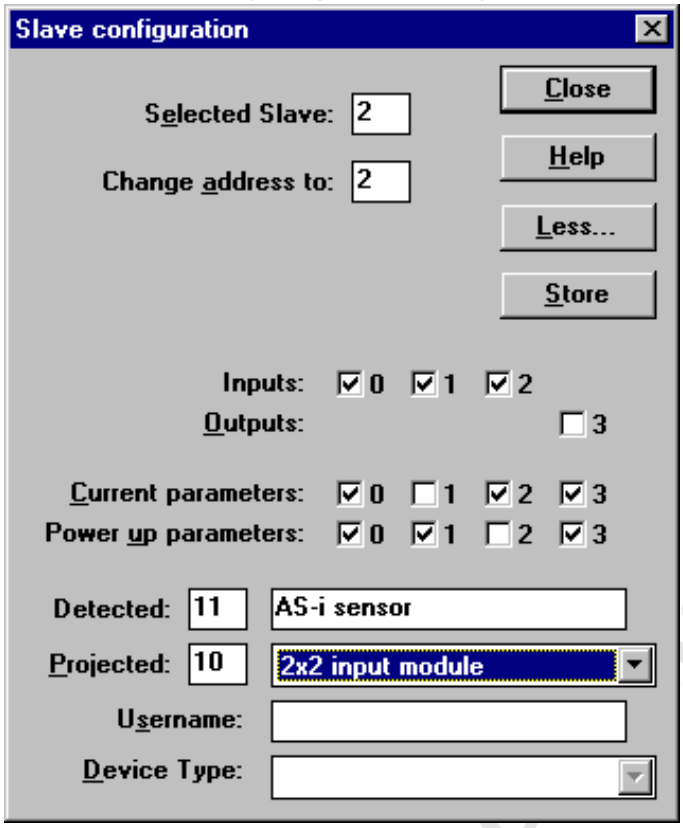
8.1 Windows Software AS-i Control Tools

1. Start the AS-i Control Tools.
2. Call the command Master | New.



3. Choose INTERBUS as protocol.
4. Do the appropriate settings.
5. Call the command Master | AS-i configuration.
   The AS-i configuration editor will be started. All detected and projected AS-i slaves are displayed in this window.

6. Click on a slave entry to open the dialog box "Slave configuration".



This dialog box is for changing a slave address, setting AS-i parameters or AS-i configuration data. Additionally you can test inputs and outputs.

A very easy approach to configure the AS-i circuit is connecting each AS-i slave to the line and setting the AS-i slave address one after the other. After that press the button “Store configuration” to adopt the detected AS-i circuit to the AS-i master as projected data.

Moreover you can use the **AS-i Address Assistant**. This tool changes automatically the address of an AS-i slave to the desired address after plugging the slave to the AS-i line. The desired AS-i configuration can be created off-line before and stored to a file. When you build up the plant you only have to plug the AS-i slaves to the AS-i line one after the other.

Further descriptions to all features of the software can be obtained from the integrated help.

9 Appendix: Displaying the Figure Display

In the basic state of the configuration mode, the display shows one after the other the addresses of all detected slaves at a rate of two per second. A blank display means that the *LDS* is empty, i.e. no slaves were detected.

In the basic state of the protected operating mode, the display is either blank or displays the address of a faulty assignment (see chapter 5.3.2).

During manual address programming, the slave address display has a different meaning (see chapter 5.4 and 5.5).

All displayed numbers that are bigger than 31 and therefore can not be interpreted as a slave address are status or error messages of the master. They have the following meanings:

39	Advanced AS-i diagnostics: If a 39 appears on the display after pressing the 'set'-button a short-time AS-i power failure occured.
OFP	The AS-i master is in off-line phase.
SEA	The AS-i master is in detection phase.
42	The AS-i master is in activation phase.
43	The AS-i master starts the normal operating mode.
70	Hardware error: The AS-i master's EEPROM cannot be written to.
72	Hardware error: The PIC processor does not respond.
73	Hardware error: The PIC processor does not respond.
74	Checksum error in the EEPROM.
80	Error while attempting to exit the configuration mode: A slave with address zero exists.
81	General error while changing a slave address.
88	Display test while starting up the AS-i master
90	Error while changing a slave address in protected operating mode: No slave with address 0 existing.
91	Error while changing slave address: Target address is already occupied.
92	Error while changing slave address: New address could not be set.
93	Error while changing slave address: New address could only be stored volatile in the slave.
94	Error while changing slave address in protected operating mode: Slave has wrong configuration data.
95	Error while changing slave address in protected operating mode: The configuration error was caused by one slave too many (instead of one missing slave).

10 Appendix: The First Commissioning of AS-i

Note

In this chapter an example is given of how to put an AS-i network into operation quickly and easily and without the need for external devices. The addressing of the components connected to the AS-i network can be performed directly on the AS-i master. It is of course more comfortable to do the addressing with a hand-held programming device or with the Windows software AS-i Control Tools. However, it is possible to configure even complex networks using only the AS-i master.

What to do ?	How to go about it?
See to it that the AS-i master is properly supplied with power.	Connect the AS-i power supply unit to the terminals AS-i + and AS-i - of the master, connect the ground terminal. Turn on the power supply.
After the self-test: the LEDs ”AS-i” and “PRJ” are on. The figure display shows “OFP”: the AS-i master is in the off-line phase. Shortly after that a “SEA” will be displayed: the AS-i master stays in the detection phase.	
Switch the device to the projecting mode, if the yellow LED does not light up.	Press the “MODE”-button for approx. five seconds.
The yellow LED “PRJ” lights up. The device is now in projecting mode.	
Add a slave with the address 0 to the AS-i line.	Connect the slave's terminals with the terminals AS-i +/- of the master.
The green LED “ACTIVE” lights up. The figure display shows “0”. This means the AS-i master has detected the slave.	
Change the slave address to address 1.	Select address 1 by pressing the “SET” button shortly, if necessary repeatedly, whereby after each operation the next in each case free address is indicated. When a “1” appears on the display press the “SET” button for approx. five seconds until the display blinks. Press again shortly the “SET” button to assign the new address to the slave.
The AS-i master detects the slave with address 1 and displays “1”.	
Connect another slave with address 0 to the AS-i line and allocate the address 2 to it.	Connect the slave to the AS-i line. The addressing is the same as for the previous slave.
The addresses of all slaves detected are now displayed sequentially.	

What to do ?	How to go about it?
Change to the protected operating mode and store the AS-i configuration.	Leave the configuration mode by pressing the “MODE” button for at least five seconds until the “PRJ” LED goes out.
The configuration of the AS-i master is now finished.	

11 Technical Data

Product Description

The AS-i/INTERBUS gateway can be used to integrate an AS-i bus into an INTERBUS network.

Features

- full functionality of an AS-i master
- INTERBUS protocol
- electrical isolation between INTERBUS and AS-i
- capability of connecting up to 62 slaves with up to 248 digital inputs and 186 digital outputs
- status and diagnostic LEDs
- three-digit seven-segment LED-display
- two push-buttons for configuration
- configuration mode
- Advanced AS-i diagnostics

11.1 AS-i INTERBUS Inline

Type	AS-i gateway to INTERBUS (Inline)
Product Number	27 41 22 8
Identification code	223 decimal
Register length	2 / 4 / 6 / 8 / 10 / 12 / 14 / 16 words (dependent on the length of the process data)
Degree of protection	IP 20
EMC directions	EN 50081, EN 50082
Permissible operating temperature	0 °C ... 55 °C (32 °F ... 131 °F)
Permissible storage temperature	-25 °C ... 85 °C (-13 °F ... 185 °F)
Dimensions (w x d x h)	73.2 x 120 x 71.5 mm

Applications

- connection of binary sensors and actuators to the INTERBUS remote bus

Power Supply

AS-i side	approx. 200 mA from the AS-i PSU (nominal 30 V direct current)
Electrical isolation	500 V alternating current between INTERBUS and AS-i

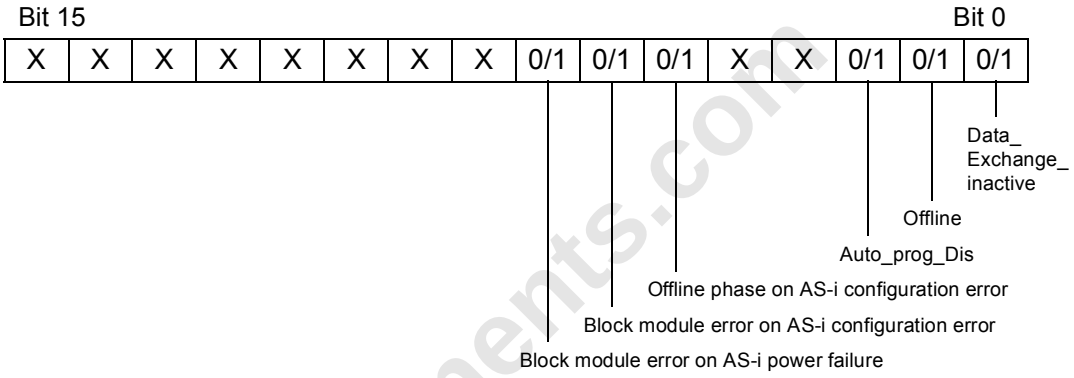
12 Appendix: Data Format of the Process Data Channel

Note

For the assignment of the (Word.Bit) or (Byte.Bit) view to the user set control or computer system, please refer to data sheet DB GB IBS SYS ADDRESS, Order No. 90 00 99 0.

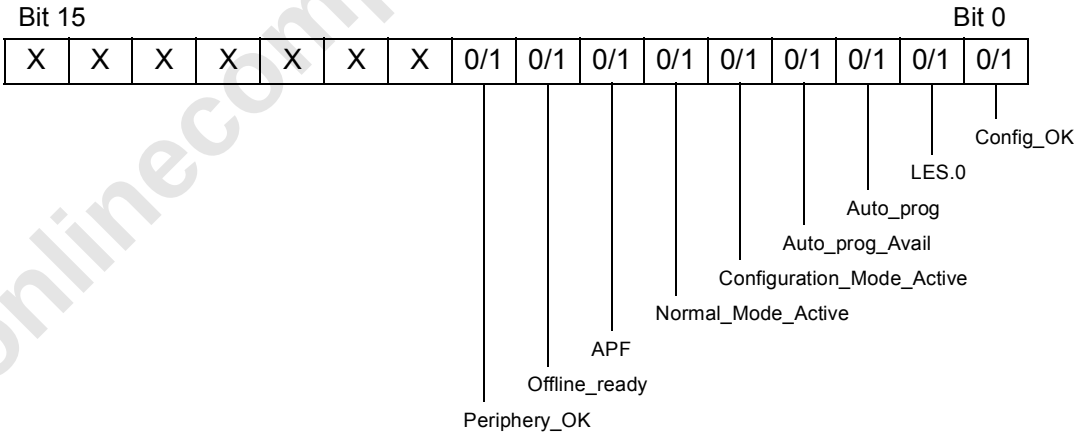
12.1 Control Word and Status Word

Control word from INTERBUS master to AS-i/INTERBUS gateway



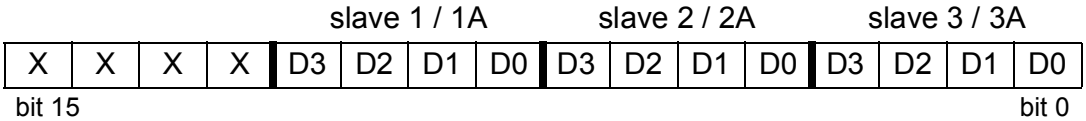
(bit set: active, bit deleted: off)

Status word from AS-i/INTERBUS gateway to INTERBUS master

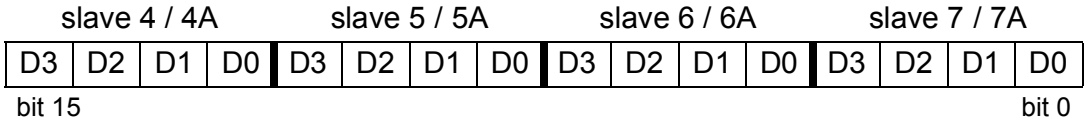


12.2 Inputs and Outputs of the slaves

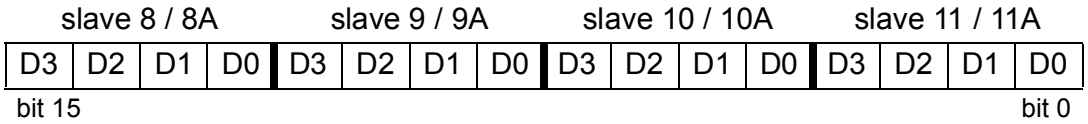
1st word



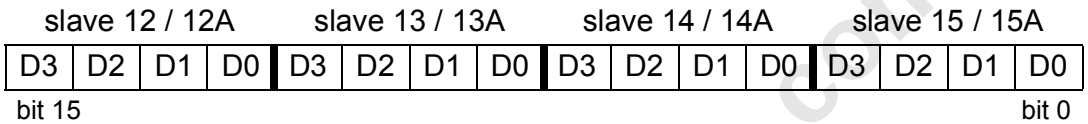
2nd word



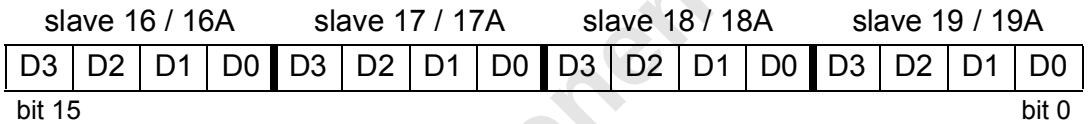
3rd word



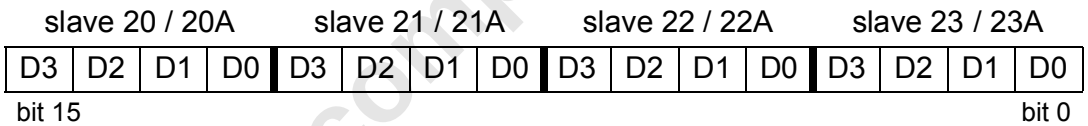
4th word



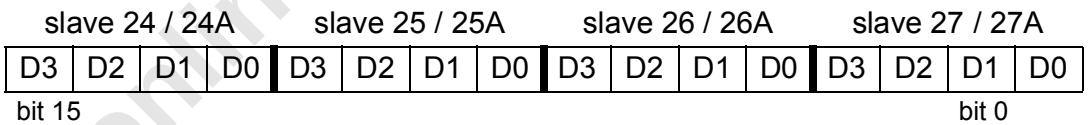
5th word



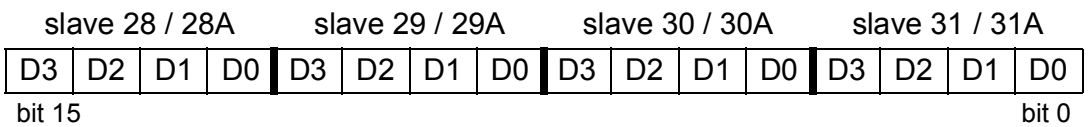
6th word



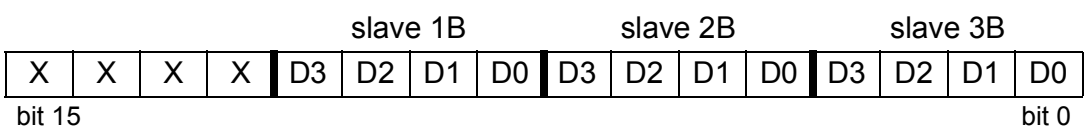
7th word



8th word



9th word



10th word

slave 4B				slave 5B				slave 6B				slave 7B			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
bit 15															bit 0

11th word

slave 8B				slave 9B				slave 10B				slave 11B			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
bit 15															bit 0

12th word

slave 12B				slave 13B				slave 14B				slave 15B			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
bit 15															bit 0

13th word

slave 16B				slave 17B				slave 18B				slave 19B			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
bit 15															bit 0

14th word

slave 20B				slave 21B				slave 22B				slave 23B			
D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0	D3	D2	D1	D0
bit 15															bit 0

The slave 24B ... 31B are only accessible via the PCP-channel.

Each slave receives four bits from the INTERBUS master. It can only process the data those bit positions for which it has outputs.

Each slave sends four bits. Only those bit positions supply valid data for which the slave has inputs.

A typical constellation is (2I/2O-slaves):

slave n			
Input	Input	Output	Output
bit 15			bit 12
bit 11			bit 8
bit 7			bit 4
bit 3			bit 0

12.3 Slave Lists of the AS-i/INTERBUS Gateway

The AS-i/INTERBUS gateway has several lists, with which it can detect changes on the AS-i network. These changes can have physical reasons (slave added or

slave failed) and logical reasons (slave is not configured the right way). These lists are:

List of active slaves (LAS)

The AS-i/INTERBUS gateway adds an entry for every slave, that can be accessed to.

List of detected slaves (LDS)

This list has an entry for every slave found while activating the network.

Liste der projektierten slaves (LPS)

This list was written by the INTERBUS master to configure all slave expected by the control program of the master.

The AS-i/INTERBUS gateway switches the LED CONFIG ERR on, if a slave was projected or detected during the start-up, but is not active. This means in normal operation mode the failure of a slave.

12.3.1 Object Dictionary (OD) Description

The AS-i/INTERBUS gateway uses the following OD object description:

OD-Header-Attribut	Belegung	Bemerkung
Index	0	The index of the OD header is always 0.
ROM/RAM-Flag	false	No changes in the OD permitted in runtime.
Name length	0	There is no object adressing by name.
Access Protection Supported	true	Access rights to communication objects are supported.
Version OD	0	
Local address OD object description	implementation dependent	
ST-OD length	71	The ST-OD has 71 entries. The indexes 1-14 are reserved for standard types. Additional data type structure descriptions for the records to be defined are required in addition. Index 40-46: data type structure description for the coupler. The gaps must be filled with null objects.
Local address-ST-OD	implementation dependent	
First index S-OD	5F50h	
S-OD length	73	
Local address S-OD	implementation dependent	

OD-Header-Attribut	Belegung	Bemerkung
First index DV-OD	C000 0000h	
DV-OD length	0	There is no dynamic variables list dictionary.
Local address DV-OD	FFFFFFFFh	No real DV-OD object is required.
First index P-OD	E000 0000h	
P-OD length	0	There is no real program invocation dictionary.
Local address P-OD	FFFFFFFFh	No real P-OD object is required.

13 Parameter Data Channel (PCP)

13.1 Services Supported

The AS-i/INTERBUS gateway operates exclusively as an INTERBUS server, i. e. it provides services to the INTERBUS master.

INTERBUS communications services of the AS-i/INTERBUS gateway:

Service	Function group	Client/Server	Confirmed/unconfirmed
Initiate	Administration	Server	Confirmed
Abort	Administration	Client/Server	Unconfirmed
Reject	Administration	Client/Server	Unconfirmed
Status	Administration	Server	Confirmed
Identify	Administration	Server	Confirmed
Get-OD (long)	Administration	Server	Confirmed
Write	Application	Server	Confirmed
Read	Application	Server	Confirmed

This means that the AS-i/INTERBUS gateway provides READ and WRITE services in addition to the services provided on INTERBUS.

Data traffic with the AS-i slaves is preferably handled over the process data channel, as this route is faster (maximum cycle time 15 ms) and all the slaves are addressed and queried in parallel.

13.2 Communication Relationship List (CRL)

The communication relationship list on the AS-i/INTERBUS gateway contains just one entry. The AS-i/INTERBUS gateway has only one communication relationship to INTERBUS address 0. In other words: once the INTERBUS master has sent a request to the AS-i/INTERBUS gateway, it must wait until it has received the confirmation. Only then may it send the next request. The AS-i/INTERBUS gateway does not support symbolic names, only a virtual field device and no priorities.

Structure of the CRL header in the gateway:

Attribute	Value in the AS-i/INTERBUS gateway CRL
CR	0
Number of CRL entries	1
Symbol length	0
VFD pointer supported	false

CRL entries for the AS-i/INTERBUS gateway:

Attributes of the CRL entry	PMS connection
CR	2
Remote Address	0
Type	MMAZ
max SCC	1
max RCC	1
max SAC	1
max RAC	1
ACI	0
Connection attribute	D
Max-PDU-Sending-High	0
Max-PDU-Sending-Low	192
Max-PDU-Receiving-High	0
Max-PDU-Receiving-Low	192
Services supported	Get-OD (long) (ind/rsp) Write (ind/rsp); Read (ind/rsp) (bit 0..47) 00 00 00 80 30 00
Max-Number of Outstanding Client Services	1
Max-Number of Outstanding Server Services	1
Type-of-Connection	true
Symbol	No entry

13.3 Communication Objects for the AS-i/INTERBUS Gateway

The communication objects in the AS-i/INTERBUS gateway describe the services that the AS-i/INTERBUS gateway provides through the PCP services READ and WRITE.

13.3.1 List of Projected Slaves (index 5F50)

(WRITE, Data-Type-Index 10h)

The list of projected slaves contains one bit for each slave installed on the AS-i. Set the bit for the address of each slave to be installed. Should one of these slaves fail, or should the AS-i/INTERBUS gateway find additional slaves, the AS-i/INTERBUS gateway will report a configuration error to the INTERBUS-S master through the status word.

- List of projected slaves (LPS):

Byte 0 slaves 1 - 7 / 1A - 7A

S7*	S6	S5	S4	S3	S2	S1	0

Byte 1 slaves 8 - 15 / 8A - 15A

S15	S14	S13	S12	S11	S10	S9	S8

Byte 2 slaves 16 - 23 / 16A - 23A

S23	S22	S21	S20	S19	S18	S17	S16

Byte 3 slaves 24 - 31 / 24A - 31A

S31	S30	S29	S28	S27	S26	S25	S24

Byte 4 slaves 1B - 7B

S7B	S6B	S5B	S4B	S3B	S2B	S1B	0

Byte 5 slaves 8B - 15B

S15B	S14B	S13B	S12B	S11B	S10B	S9B	S8B

Byte 6 slaves 16B - 23B

S23B	S22B	S21B	S20B	S19B	S18B	S17B	S16B

Byte 7 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B

*"0": slave is not projected, i. e. no slave with this address has to be installed,
"1": slave is projected, i. e. a slave with this address has to be installed.

13.3.2 Configuration Mode (index 5F51)

(WRITE, Data-Type-Index 01h)

This command is used to put the AS-i/INTERBUS gateway into configuration mode.

- Configuration mode

Byte 0

0xFF/0x00 (true/false)

00h (false) = configuration mode off (protected mode)
ffh (true) = configuration mode on

13.3.3 Parameterize Slave$_i$ (index 5F52-5F8F)

(WRITE, Data-Type-Index 10h, i = 1 ... 62)

With this service, you can send the 4 bits of parameter data to the selected AS-i slave. This command is used, for instance, to modify the properties of a slave during operation.

- Parameters to be sent to slave$_i$:

Byte 0 slave$_i$

X	X	X	X	P3	P2	P1	P0

P3, P2, P1, P0: Parameters for the slave

13.3.4 Store Actual Parameters (index 5F90)

(WRITE, Data-Type-Index 01h)

This service is used to save the current parameter settings of all AS-i slaves as the new stored parameter settings, i. e. the current parameter settings will be restored the next time the AS-i is switched on. This command uses one byte of input data.

- Store current parameters of all slaves (1-31 / 1B - 31B) as permanent parameters.

Byte 0

0xFF/0x00 (true/false)

00h (false) = no effect

ffh (true) = store current parameters

13.3.5 Store Actual Configuration (index 5F91)

(WRITE, Data-Type-Index 01h)

This service is used to save the current configuration of all AS-i slaves as the new stored configuration, i. e. the current configuration will be taken as the desired configuration the next time the AS-i is switched on. This command uses one byte of input data.

- Store configuration of all slaves (1-31 / 1B - 31B) as projected configuration.

Byte 0

0xFF/0x00 (true/false)

00h (false) = no effect

ffh (true) = store current configuration

13.3.6 Output Data (index 5F92)

(READ, WRITE, Data-Type-Index 10h)

Use this command to write the output data to the AS-i sensors.

- Output data field (FOD). This field contains 4 bits for each AS-i slave. You should, preferably, send these data through the process data channel. The data for the slaves 24B ... 31B can only be reached via the PCP-channel.

Byte 0 slave 1 / 1B

X	X	X	X	D3	D2	D1	D0

Byte 1 slave 2 -3 / 2B - 3B

D3	D2	D1	D0	D3	D2	D1	D0

.
.
.

Byte 15 slave 30 - 31 / 30B - 31B

D3	D2	D1	D0	D3	D2	D1	D0

Byte 16 slave 1B

X	X	X	X	D3	D2	D1	D0

Byte 17 slave 2B -3B

D3	D2	D1	D0	D3	D2	D1	D0

.
.
.

Byte 31 slave 30B - 31B

D3	D2	D1	D0	D3	D2	D1	D0

D3, D2, D1, D0: Data to the slave

13.3.7 Read Stored Configuring Data (index 5F93)

(READ, Data-Type-Index 40h)

The stored data is a description of the desired state that should exist on the AS-i. This data must be previously written by the “configure slave$_i$” service into the AS-i/ INTERBUS gateway, where it is stored in non-volatile memory.

- Stored configuration data field. This field contains 16 bits for each slave, by means of which its properties can be set.

Byte 0, 1 slave 1

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

Byte 2, 3 slave 2

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

.
.
.

Byte 60, 61 slave 31

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

IO3, IO2, IO1, IO0: I/O-configuration (identifies number of inputs and outputs)

ID_3, ID_2, ID_1, ID_0: ID-configuration (identifies AS-i slave type)

ID1_3, ID1_2, ID1_1, ID1_0: ID1-Code

ID2_3, ID2_2, ID2_1, ID2_0: ID2-Code

- Stored parameters field. This field contains four bits for each AS-i slave, these are transmitted to the slaves immediately after switch on.

Byte 62 slave 1 / 1A

X	X	X	X	P3	P2	P1	P0

Byte 63 slave 2 - 3 / 2A - 3A

P3	P2	P1	P0	P3	P2	P1	P0

.
.
.

Byte 77 slave 30 - 31 / 30A - 31A

P3	P2	P1	P0	P3	P2	P1	P0

Byte 78 slave 1B

X	X	X	X	P3	P2	P1	P0

.
.
.

Byte 108 slave 30B - 31B

P3	P2	P1	P0	P3	P2	P1	P0

P3, P2, P1, P0: Parameters for the slave

- List of projected slaves (LPS). This field contains one address for each possible slave address, indicating whether or not this address should be assigned.

Byte 109 slaves 1 - 7 / 1A - 7A

S7*	S6	S5	S4	S3	S2	S1	0

Byte 110 slaves 8 - 15 / 8A - 15A

S15	S14	S13	S12	S11	S10	S9	S8

Byte 111 slaves 16 - 23 / 16A - 23A

S23	S22	S21	S20	S19	S18	S17	S16

Byte 112 slaves 24 - 31 / 24A - 31A

S31	S30	S29	S28	S27	S26	S25	S24

Byte 113 slaves 1B - 7B

S7B	S6B	S5B	S4B	S3B	S2B	S1B	0

Byte 114 slaves 8B - 15B

S15B	S14B	S13B	S12B	S11B	S10B	S9B	S8B

Byte 115 slaves 16B - 23B

S23B	S22B	S21B	S20B	S19B	S18B	S17B	S16B

Byte 116 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B

*"0": slave is not projected, i. e. no slave with this address has to be installed,
"1": slave is projected, i. e. a slave with this address has to be installed.

13.3.8 Configure Slave$_i$ (index 5FE3-5FD1)

(WRITE, Data-Type-Index 41h, i = 1 ... 62)

With this service you can transmit the 8 bits of configuration data and 4 bits of parameter data for an AS-i slave to the AS-i/INTERBUS gateway. There this data is stored in non-volatile memory.

- configuration data of slave$_i$

Byte 0, 1 slave$_i$

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

IO3, IO2, IO1, IO0: I/O-configuration (identifies number of inputs and outputs)

ID_3, ID_2, ID_1, ID_0: ID-configuration (identifies AS-i slave type)

ID1_3, ID1_2, ID1_1, ID1_0: ID1-Code

ID2_3, ID2_2, ID2_1, ID2_0: ID2-Code

- Parameters of slave$_i$ to be stored:

Byte 2 slaves$_i$

X	X	X	X	P3	P2	P1	P0

P3, P2, P1, P0: Parameters for the slave

13.3.9 Data Transfer (Control Word) (index 5FD2)

(READ, WRITE, Data-Type-Index 01h)

Use this service to transmit the information for the control word also via the parameter data channel.

- transfer control word via parameter data channel

Byte 0; Data exchange inactive

0xFF/0x00 (true/false)

00h (false) = The data exchange between the AS-i master and the AS-i slaves is enabled.

ffh (true) = The data exchange between the AS-i master and the AS-i slaves is disabled.

Byte 1; Offline

0xFF/0x00 (true/false)

00h (false) = The AS-i network starts up again. Data is being exchanged.

ffh (true) = All AS-i slaves are reset. No communication takes place in the AS-i network.

Byte 2; Auto_Prog_Disable

0xFF/0x00 (true/false)

00h (false) = The AS-i slaves can be automatically addressed.

ffh (true) = The AS-i slaves cannot be automatically addressed.

13.3.10 Read Configuration Data (index 5FD3)

(READ, Data-Type-Index 43h)

You can use this command to read the actual state of the AS-i. You will obtain the following information for each of the 32 possible addresses (including AS-i address 0, which can be occupied by a slave that is yet to be programmed).

- Configuration data images field. The AS-i/INTERBUS gateway reads this information from the slaves during the detection phase.

Byte 0, 1 slave 0

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

Byte 2, 3 slave 1 / 1A

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

.
.
.

Byte 62, 63 slave 31 / 31A

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

Byte 64, 65 slave 1B

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

.
.
.

Byte 124, 125 slave 31B

ID2_3	ID2_2	ID2_1	ID2_0	ID1_3	ID1_2	ID1_1	ID1_0
ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0

IO3, IO2, IO1, IO0: I/O-configuration (identifies number of inputs and outputs)

ID_3, ID_2, ID_1, ID_0: ID-configuration (identifies AS-i slave type)

ID1_3, ID1_2, ID1_1, ID1_0: ID1-Code

ID2_3, ID2_2, ID2_1, ID2_0: ID2-Code

- List of detected slaves (LDS). This list contains one bit for each address and indicates whether a slave has been found.

Byte 126 slaves 0 - 7 / 0A - 7A

S7*	S6	S5	S4	S3	S2	S1	S0

Byte 127 slaves 8 - 15 / 8A - 15A

S15	S14	S13	S12	S11	S10	S9	S8

Byte 128 slaves 16 - 23 / 16A - 23A

S23	S22	S21	S20	S19	S18	S17	S16

Byte 129 slaves 24 - 31 / 24A - 31A

S31	S30	S29	S28	S27	S26	S25	S24

Byte 130 slaves 0B - 7B

S7B	S6B	S5B	S4B	S3B	S2B	S1B	S0B

Byte 131 slaves 8B - 15B

S15B	S14B	S13B	S12B	S11B	S10B	S9B	S8B

Byte 132 slaves 16B - 23B

S23B	S22B	S21B	S20B	S19B	S18B	S17B	S16B

Byte 133 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B

*"0": No slave with this address has been detected on the AS-i network.

"1": A slave with this address has been detected on the AS-i network.

You can frequently find the reason for a CONFIG ERR message from the AS-i/INTERBUS gateway by comparing the list of projected slaves (LPS), list of detected slaves (LDS), and list of active slaves (LAS).

13.3.11 Read Parameters (index 5FD4)

(READ, Data-Type-Index 44h)

You can use this command to read the current parameter data for the AS-i slaves. You will obtain the following data.

- four bits parameters for each slave

Byte 0 slave 1 / 1A

X	X	X	X	P3	P2	P1	P0

Byte 1 slave 2 - 3 / 2A - 3A

P3	P2	P1	P0	P3	P2	P1	P0

.
.
.

Byte 16 slave 30 - 31 / 30A - 31A

P3	P2	P1	P0	P3	P2	P1	P0

Byte 16 slave 1B

X	X	X	X	P3	P2	P1	P0

.
.
.

Byte 31 slave 30B - 31B

P3	P2	P1	P0	P3	P2	P1	P0

P3, P2, P1, P0: current parameters of the slaves

- list of active slaves (LAS). One bit is set here for each slave that the AS-i/INTERBUS gateway has currently access to.

Byte 32 slaves 0 - 7 / 0A - 7A

S7*	S6	S5	S4	S3	S2	S1	S0

Byte 33 slaves 8 - 15 / 8A - 15A

S15	S14	S13	S12	S11	S10	S9	S8

Byte 34 slaves 16 - 23 / 16A - 23A

S23	S22	S21	S20	S19	S18	S17	S16

Byte 35 slaves 24 - 31 / 24A - 31A

S31	S30	S29	S28	S27	S26	S25	S24

Byte 36 slaves 0B - 7B

S7B	S6B	S5B	S4B	S3B	S2B	S1B	S0B

Byte 37 slaves 8B - 15B

S15B	S14B	S13B	S12B	S11B	S10B	S9B	S8B

Byte 38 slaves 16B - 23B

S23B	S22B	S21B	S20B	S19B	S18B	S17B	S16B

Byte 39 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B

*"0": No slave with this address is active in the AS-i network,

"1": A slave with this address is active in the AS-i network.

13.3.12 Modify Operating Address (index 5FD5)

(WRITE, Data-Type-Index 45)

Use this command to modify the address of an AS-i slave and thus the position of its input and output data in the process data channel.

- old slave address (0 ... 31/31A/31B)

Byte 0

X	X	AB	0x00-0x1F

- new slave address (0 ... 31/31A/31B)

Byte 1

X	X	AB	0x00-0x1F

AB = 0 single slave or A-slave

AB = 1 B-slave

13.3.13 Input Data (index 5FD6)

(READ, Data-Type-Index 46h)

Use this command to read the input data from the AS-i sensors.

- input data field. This field contains 4 bits for each AS-i slave. You should, preferably, request these data through the process data channel. The data for the slaves 24B ... 31B can only be reached via the PCP-channel.

Byte 0 slave 1 / 1A

X	X	X	X	D3	D2	D1	D0

Byte 1 slave 2 - 3 / 2A - 3A

D3	D2	D1	D0	D3	D2	D1	D0

.
.
.

Byte 15 slave 30 - 31 / 30A - 31A

D3	D2	D1	D0	D3	D2	D1	D0

Byte 16 slave 1B

X	X	X	X	D3	D2	D1	D0

Byte 17 slave 2B -3B

D3	D2	D1	D0	D3	D2	D1	D0

.
.
.

Byte 31 slave 30B - 31B

D3	D2	D1	D0	D3	D2	D1	D0

D3, D2, D1, D0: Data from slave

- list of active slaves (LAS). This list contains one bit for each slave indicating that this slave is active. Only the input data from the slaves entered in the list of active slaves are valid.

Byte 32 slaves 0 - 7 / 0A - 7A

S7*	S6	S5	S4	S3	S2	S1	S0

Byte 33 slaves 8 - 15 / 8A - 15A

S15	S14	S13	S12	S11	S10	S9	S8

Byte 34 slaves 16 - 23 / 16A - 23A

S23	S22	S21	S20	S19	S18	S17	S16

Byte 35 slaves 24 - 31 / 24A - 31A

S31	S30	S29	S28	S27	S26	S25	S24

Byte 36 slaves 0B - 7B

S7B	S6B	S5B	S4B	S3B	S2B	S1B	S0B

Byte 37 slaves 8B - 15B

S15B	S14B	S13B	S12B	S11B	S10B	S9B	S8B

Byte 38 slaves 16B - 23B

S23B	S22B	S21B	S20B	S19B	S18B	S17B	S16B

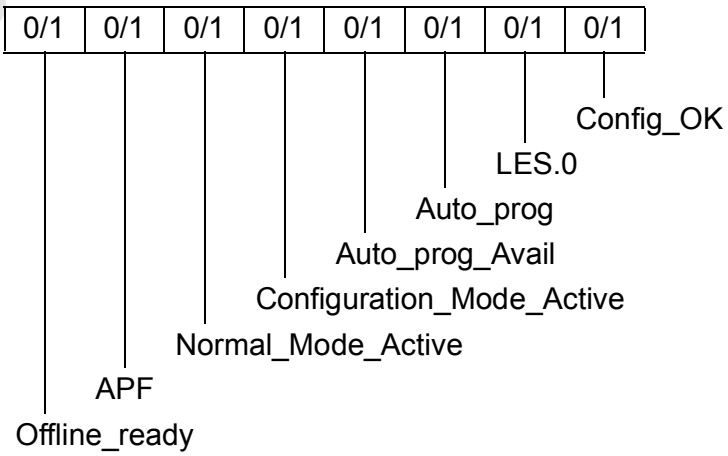
Byte 39 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B

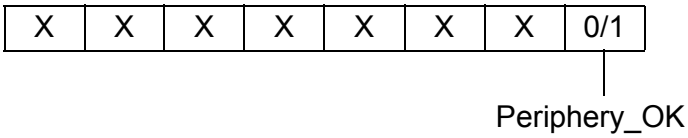
*"0": slave is not active,
"1": slave is active.

- Status word

Byte 40



Byte 41



13.3.14 Command Call (index 5FD7)

(WRITE, Data-Type-Index 47)

Use this command to send a command to an AS-i slave.

- slave address (0..31/31A/31B)

Byte 0

X	X	AB	0x00-0x1F

AB = 0 single slave or A-slave

AB = 1 B-slave

- command (information part)

Byte 1

X	X	X	I4	I3	I2	I1	I0

I0 ... I4 Information bits to the AS-i slave

13.3.15 Enable Process Ouput Data (index 5FD8)

(READ, WRITE, Data-Type-Index 01h)

Use this service to determine through which channel the AS-i/INTERBUS gateway receive the process output data.

- Enable process output data via the parameter data channel:

Byte 0

0xFF/0x00 (true/false)

0xFF = Output data through PCP
0x00 = Output data through process data channel

13.3.16 Read and Delete Advanced Diagnosis Data (index 5FD9)

(READ, Data-Type-Index 48h)

This service serves to read the data of the advanced diagnosis. Everytime the INTERBUS master reads this oject, error counters and LCS are deleted.

- error counters

Byte 0 AS-i power failure

APF

Byte 1 slave 1 / 1A

FZ1

.
.
.

Byte 31 slave 31 / 31A

FZ31

Byte 32 slave 1B

FZ1B

.
.
.

Byte 62 slave 31B

FZ31B

APF: number of short-time power failures
FZi: number of errorneous telegrams to slave i
(255 = counter overflow)

- LCS

Byte 63 slaves 0 - 7 / 0 - 7A

S7*	S6	S5	S4	S3	S2	S1	S0

Byte 64 slaves 8 - 15 / 8A - 15A

S15	S14	S13	S12	S11	S10	S9	S8

Byte 65 slaves 16 - 23 / 16A - 23A

S23	S22	S21	S20	S19	S18	S17	S16

Byte 66 slaves 24 - 31 / 24A - 31A

S31	S30	S29	S28	S27	S26	S25	S24

Byte 67 slaves 1B - 7B

S7B	S6B	S5B	S4B	S3B	S2B	S1B	0

Byte 68 slaves 8B - 15B

S15B	S14B	S13B	S12B	S11B	S10B	S9B	S8B

Byte 69 slaves 16B - 23B

S23B	S22B	S21B	S20B	S19B	S18B	S17B	S16B

Byte 70 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B

S0:

"0": AS-i power supply O.K.,
"1": short-time failure of the AS-i power supply occured.

S1-S31:

*"0": slaves with this address didn't have any configuration errors,
"1": slaves with this address caused a short-time configuration error.

13.3.17 Block the Module Errors (index 5FDA)

(READ, WRITE, Data-Type-Index 49h)

The module error messages "AS-i power failure" and "AS-i configuration error" can be blocked separately, both via the process data and PCP. Both blocks for each error source are logically combined as OR, i. e. the module errors are only reported if they are not blocked via PCP nor via the process data.

- block module errors

Byte 0; modul error on AS-i power failure

0xFF/0x00 (true/false)

00h (false) = blocking depends on the control word
FFh (true) = modul error message blocked

Byte 1; Modulfehler bei AS-i-Konfigurationsfehlern

0xFF/0x00 (true/false)

00h (false) = blocking depends on the control word
FFh (true) = modul error message blocked

13.3.18 LOS (index 5FDB)

(READ, WRITE, Data-Type-Index 10h)

The object for the list of slaves, that shall release the offline phase when they have an error, is also an octet string with 32 bits as the other slave lists, too.

In any case writing this list acknowledges the release of the offline phase, wether this function was activated by this object or setting bit 5 of the control word.

- LOS

Byte 0 slaves 1 - 7 / 1A - 7A

S7*	S6	S5	S4	S3	S2	S1	X

Byte1 slaves 8 - 15 / 8A - 15A

S15	S14	S13	S12	S11	S10	S9	S8

Byte2 slaves 16 - 23 / 16A - 23A

S23	S22	S21	S20	S19	S18	S17	S16

Byte3 slaves 24 - 31 / 24A - 31A

S31	S30	S29	S28	S27	S26	S25	S24

Byte 4 slaves 1B - 7B

S7B	S6B	S5B	S4B	S3B	S2B	S1B	X

Byte 5 slaves 8B - 15B

S15B	S14B	S13B	S12B	S11B	S10B	S9B	S8B

Byte 6 slaves 16B - 23B

S23B	S22B	S21B	S20B	S19B	S18B	S17B	S16B

Byte 7 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B

S1-S31 / S1B-S31B:

*"0": no effect to the AS-i Master

"1": If the slave with this adress is missing in the LAS, the AS-i master goes into the offline phase.

13.3.19 Analog output data (index 5FDC-5FFA)

(READ, WRITE, Data-Type-Index 4Ah)

This service allows read and write access to the output data of analog slaves (AS-i slaves with profile 7.3 and 7.4)

- analog output data

Byte 0 slave 1, channel 0

output data low byte

Byte 1 slave 1, channel 0

output data high byte

Byte 2, 3 slave 1, channel 1
Byte 4, 5 slave 1, channel 2
Byte 6, 7 slave 1, channel 3
Byte 8, 9 slave 2, channel 0
Byte 10, 11 slave 2, channel 1
Byte 12, 13 slave 2, channel 2
Byte 14, 15 slave 2, channel 3

.
.
.

Byte 240, 241 slave 31, channel 0
Byte 242, 243 slave 31, channel 1
Byte 244, 245 slave 31, channel 2
Byte 246, 247 slave 31, channel 3

13.3.20 INTERBUS length (index 5FFB)

(READ, WRITE, Data-Type-Index 5)

If the entered value is 0 the INTERBUS length is defined by the jumpers 1-3 (see chapter 4.1.2). Otherwise the entered value is valid.

- IB-length

IB length: 0; 2, 4, 6, 8, 10, 12, 14 or 16 words

13.3.21 List of peripheral faults (LPF) (index 5FFC)

(READ, Data-Type-Index 10h)

The list of slaves with peripheral faults contains one set bit for each slave that reports a peripheral fault. If at least one slave has a peripheral fault the AS-i/INTERBUS gateway reports a peripheral fault via the status words to the INTERBUS master.

- List of peripheral faults (LPF)

Byte 0 slaves 1 - 7 / 1A - 7A

S7*	S6	S5	S4	S3	S2	S1	0

Byte 1 slaves 8 - 15 / 8A - 15A

S15	S14	S13	S12	S11	S10	S9	S8

Byte 2 slaves 16 - 23 / 16A - 23A

S23	S22	S21	S20	S19	S18	S17	S16

Byte 3 slaves 24 - 31 / 24A - 31A

S31	S30	S29	S28	S27	S26	S25	S24

Byte 4 slaves 1B - 7B

S7B	S6B	S5B	S4B	S3B	S2B	S1B	0

Byte 5 slaves 8B - 15B

S15B	S14B	S13B	S12B	S11B	S10B	S9B	S8B

Byte 6 slaves 16B - 23B

S23B	S22B	S21B	S20B	S19B	S18B	S17B	S16B

Byte 7 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B

*"0": Slave does not report a peripheral fault.

"1": Slave reports a peripheral fault.

13.3.22 Analog Input data (index 5FFD-601B)

(READ, WRITE, Data-Type-Index 4Ah)

This service allows read access to the input data of analog slaves (AS-i slaves with profile 7.3 and 7.4)

Missing or erroneous slaves have the value 7FFFh except of transparent slaves that have the default value 0.

- analog input data

Byte 0	slave 1, channel 0
	input data low byte
Byte 1	slave 1, channel 0
	input data high byte
Byte 2, 3	slave 1, channel 1
Byte 4, 5	slave 1, channel 2
Byte 6, 7	slave 1, channel 3
Byte 8, 9	slave 2, channel 0
Byte 10, 11	slave 2, channel 1
Byte 12, 13	slave 2, channel 2
Byte 14, 15	slave 2, channel 3
.	
.	
.	
Byte 240, 241	slave 31, channel 0
Byte 242, 243	slave 31, channel 1
Byte 244, 245	slave 31, channel 2
Byte 246, 247	slave 31, channel 3

13.4 Acknowledgements

13.4.1 Responses to the PCP Services

The response of the AS-i/INTERBUS gateway to the specified services complies with the INTERBUS standard and is determined by the Application Layer Interface (ALI). The following error messages are provided for the READ and WRITE services:

Error codes for Read.rsp (-)	
Error class	6 Access
Error code	5 Object-Attribute-Inconsistent
Additional code	10h incorrect subindex

Error codes for Write.rsp (-)	
Error class	6 Access
Error code	5 Object-Attribute-Inconsistent
Additional code	10h incorrect subindex
	12h length of service parameter “data” too great
	13h length of service parameter “data” too small

The error codes can be queried on the INTERBUS master. They assist in trouble-shooting in program development or indicate error situations in normal operation.

13.5 Example of a PCP Service

The PCP services are part of the commands which you can send to the INTERBUS master from your application program.

The following example shows the structure of a Write service that is used to configure a slave, see chapter 13.3.8. With this service you tell the AS-i master which slave type (including parameters and data direction) the AS-i master can expect at which slave address.

Configure Slave 2 CO

Index: 5FC6 (AS-i slave 2)

AS-i slave type : 3

Data direction: 8 (= 3 input bits (IO0..IO2), 1 output bit (IO3))

Parameters: 5

Structure of the associated Write service

0082		Write service (request)
0004		Quantity of subsequent command parameters
00	KR	Invoke ID ; communication reference CR
5FC6		Index for slave 2
00	02	Subindex ; number of following data bytes
38	05	Slave type, data direction; parameters

14 AS-i Protocol Implementation Conformance Statement (PICS)

No.	List of implemented Master functions		M1	Remark / Implemented by
A	**Functions or calls at host interface**			
1	Image, Status =	Read_IDI ()	√	PD, 5FD6
2	Status =	Write_OD (Image)	√	PD, 5F92
3	Status =	Set_Permanent_Parameter (S_Addr, S_Param)	√	5F94 … 5FD1
4	S_Param, Status =	Get_Permanent_Parameter (S_Addr)	√	5F93
5	Status, RS_Param =	Write_Parameter (S_Addr, S_Param)	√	5F52 … 5F8F
6	Status, S_Param =	Read_Parameter (S_Addr)	√	5FD4
7	Status =	Store_Actual_Parameters ()	√	5F90
8	Status =	Set_Permanent_Configuration (S_Addr,S_ Config)	√	5F94 … 5FD1
9	Status, S_Config =	Get_Permanent_Configuration (S_Addr)	√	5F93
10	Status =	Store_Actual_Configuration ()	√	5F91
11	Status, S_Config =	Read_Actual_Configuration (S_Addr)	√	5FD3
12	Status =	Set_LPS (S_List)	√	5F50
13	Status, S_List =	Get_LPS ()	√	5F93
14	Status, S_List =	Get_LAS ()	√	5FD4
15	Status, S_List =	Get_LDS ()	√	5FD6
16.0	Status, Flags =	Get_Flags ()	√	5FD6
16.1	Status, Flag =	Get_Flag_Config_OK ()	√	5FD6
16.2	Status, Flag =	Get_Flag_LDS.0 ()	√	5FD6
16.3	Status, Flag =	Get_Flag_Auto_Address_Assign ()	√	5FD6
16.4	Status, Flag =	Get_Flag_Auto_Prog_Available ()	√	5FD6
16.5	Status, Flag =	Get_Flag_Configuration_Active ()	√	5FD6
16.6	Status, Flag =	Get_Flag_Normal_Operation_Active ()	√	5FD6
16.7	Status, Flag =	Get_Flag_APF ()	√	5FD6
16.8	Status, Flag =	Get_Flag_Offline_Ready ()	√	5FD6
16.9	Status, Flag =	Get_Flag_Periphery_OK ()	√	5FD6
17	Status =	Set_Operation_Mode (Mode)	√	5F51
18	Status =	Set_Offline_Mode (Mode)	√	PD, 5FD2
19	Status =	Activate_Data_Exchange (Mode)	√	PD, 5FD2
20	Status =	Change_Slave_Address (S_Addr1, S_Addr2)	√	5FD5
21.1	Status =	Set_Auto_Adress_Enable (Mode)	√	PD, 5F02
21.2	Mode =	Get_Auto_Adress_Enable ()	√	5FD2
22.1	Status, Resp =	Cmd_Reset_AS-i_Slave (S_Addr, RESET)	√	5F07
22.2	Status, Resp =	Cmd_Read_IO_Configuration (S_Addr, CONF)	√	5F07
22.3	Status, Resp =	Cmd_Read_Identification_Code (S_Addr, IDCOD)	√	5F07
22.4	Status, Resp =	Cmd_Read_Status (S_Addr, STAT)	√	5F07
22.5	Status, Resp =	Cmd_Read_Reset_Status (S_Addr, STATRES)	√	5F07
22.6	Status, Resp =	Cmd_Read_Ext_ID-Code_1 (S_Addr, IDCOD1)	√	5F07
22.7	Status, Resp =	Cmd_Read_Ext_ID-Code_2 (S_Addr, IDCOD2)	√	5F07
23	Status, S_List =	Get_ List of Periphery Faults ()	√	5FFC
24	Status =	Write_Extended_ID-Code_1(S_Ext_ID-Code_1)	–	–
B	**Integrated support of slave profile**			
1	Analog slave profile S7.3		√	5FFD … 601B, 5F0C … 5FFA
2	Analog slave profile S7.4		–	–

Legend	
Symbol	Meaning
√	Function implemented
–	Function not implemented

15 We Are Interested in Your Opinion!

We would like to hear your comments and suggestions concerning this document.

We review and consider all comments for inclusion in future documentation.

Please fill out the form on the following page and fax it to us or send your comments, suggestions for improvement, etc. to the following address:

Phoenix Contact GmbH & Co. KG
Marketing Services
Dokumentation
32823 Blomberg
GERMANY

Phone +49 - (0) 52 35 - 3-00
Telefax +49 - (0) 52 35 - 3-4 20 66
E-Mail tecdoc@phoenixcontact.com

Fax Reply

Phoenix Contact GmbH & Co.
Marketing Services
Dokumentation

Date: _____

Fax No: +49 - (0) 52 35 - 3-4 20 66

From:

Company: _____
Adress: _____
City, ZIP Code: _____
Country: _____

Name: _____
Department: _____
Job Function: _____
Phone: _____
Fax: _____

Document:

Designation: _____ Revision: _____ Order No.: _____

My Opinion on the Document

Form	Yes	In part	No
Is the table of contents clearly arranged?	☐	☐	☐
Are the figures/diagrams easy to understand/helpful?	☐	☐	☐
Are the written explanations of the figures adequate?	☐	☐	☐
Does the quality of the figures meet your expectations/needs?	☐	☐	☐
Does the layout of the document allow you to find information easily?	☐	☐	☐

Contents	Yes	In part	No
Is the phraseology/terminology easy to understand?	☐	☐	☐
Are the index entries easy to understand/helpful?	☐	☐	☐
Are the examples practice-oriented?	☐	☐	☐
Is the document easy to handle?	☐	☐	☐
Is any important information missing? If yes, what?	☐	☐	☐

_____

_____

Other Comments:

_____

_____