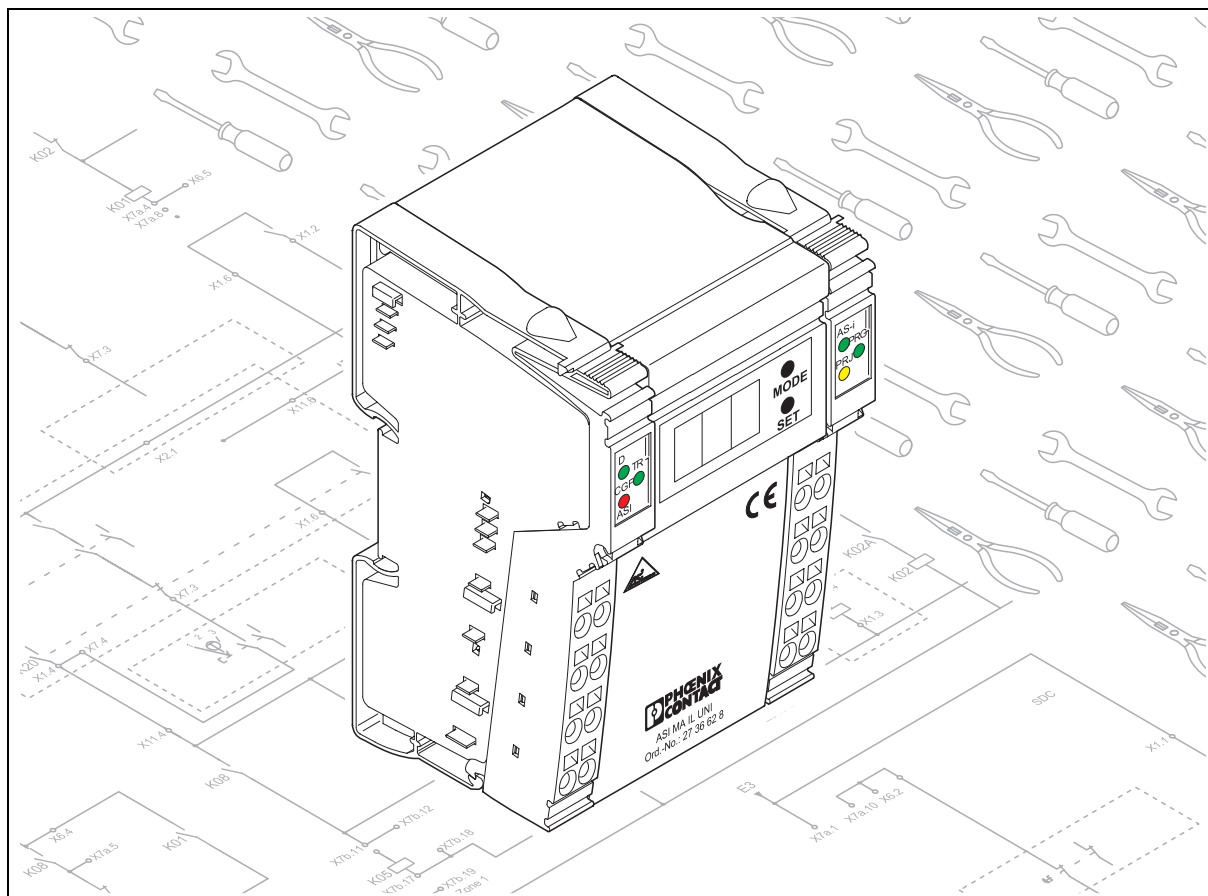


## User Manual

Configuring and Installing the  
AS-Interface Gateway for Inline

Designation: UM EN ASI MA IL UNI

Order No.: 26 99 67 1





# AS-Interface

User Manual

## **Configuring and Installing the AS-Interface Gateway for Inline**

Designation: UM EN ASI MA IL UNI

Revision: 00

Order No.: 26 99 67 1

This manual is valid for:

ASI MA IL UNI Art.-Nr. 27 36 62 8

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## **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.

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## 1 The Symbols Used



**Warning**

*This symbol warns the user of possible danger. Not following this warning can lead to personal injury or death and/or destruction of the equipment.*



**Attention**

*This symbol warns the user of a possible failure. Not following this warning can lead to total failure of the device or any other connected equipment.*



**Note**

*This symbol draws the user's attention to important information.*

## 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 exclusively be performed by appropriately qualified electrotechnical personnel. In case a failure cannot be repaired, the device must be taken out of operation and kept from inadvertently being 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 will void the warranty.*



**Note**

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

### 3 General Information

This operating instruction holds for the following devices of the Phoenix Contact GmbH & Co. KG:

- AS-i gateway for Inline ASI MA IL UNI order no. 27 36 62 8

The AS-i gateways for Inline 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.

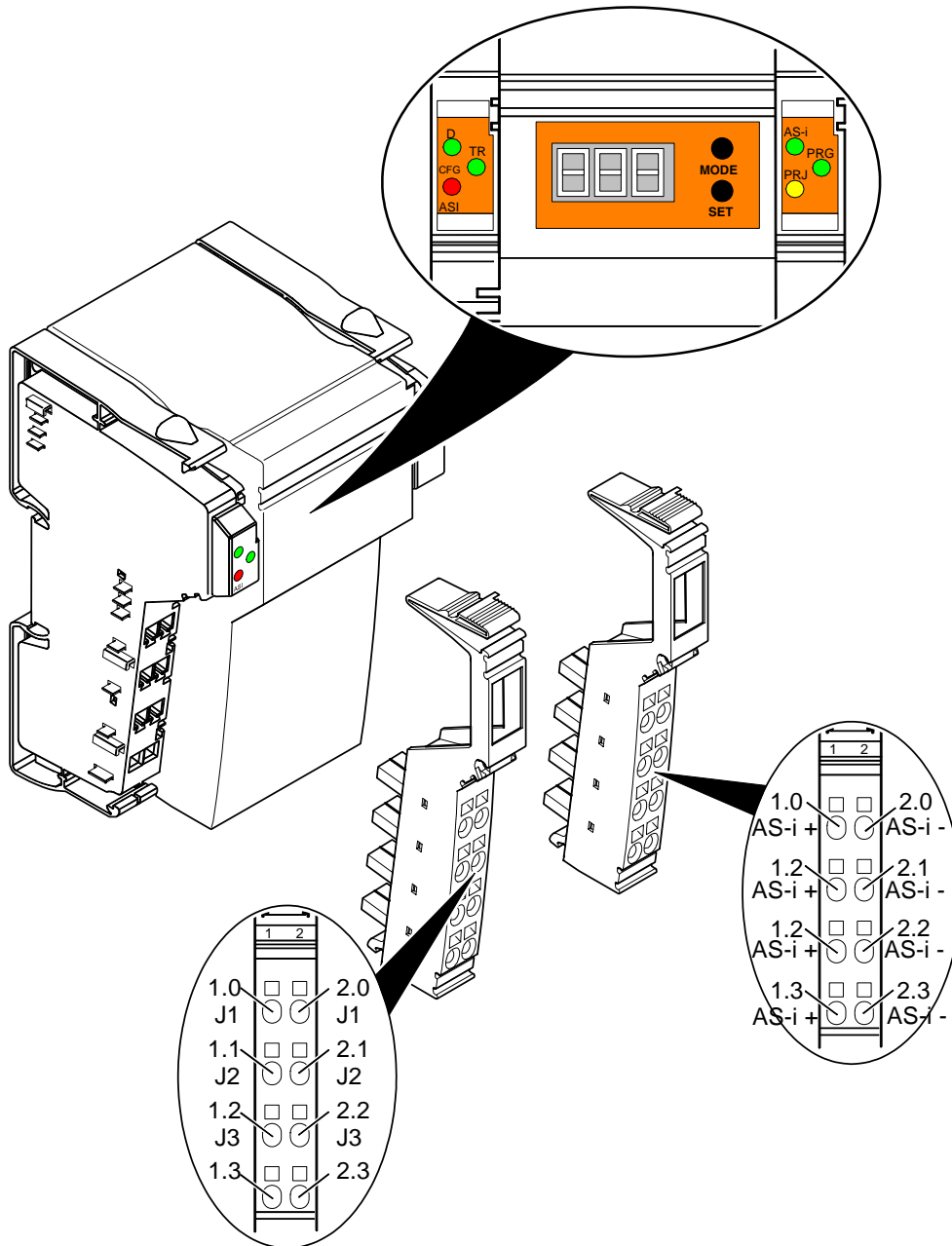
The gateways can be used in the same way. Commissioning, debugging and setting up of the AS-i parameters can be accomplished with the use of two push-buttons, the display and the LEDs directly on the device as with all AS-i masters of Phoenix Contact.

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



Please also consult the System Manual "Configuring and Installing the INTERBUS Inline Product Range" IB IL SYS PRO UM 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.

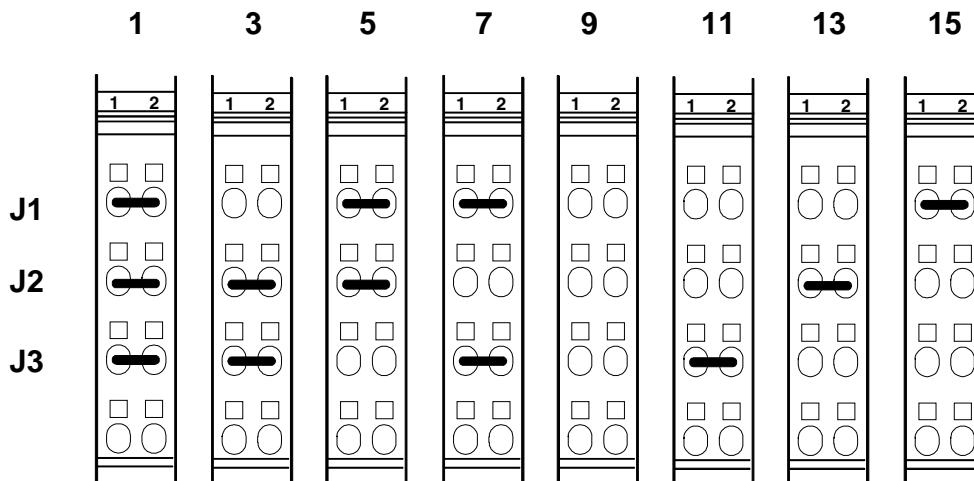
The jumpers have to be set as follows:

J1 between terminal 1.0 and 2.0

J2 between terminal 1.1 and 2.1

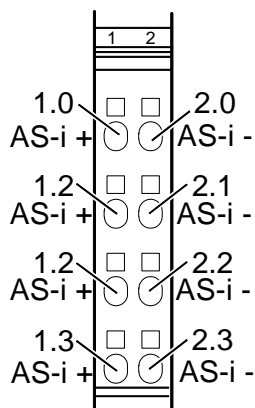
J3 between terminal 1.2 and 2.2

Length of the process data:

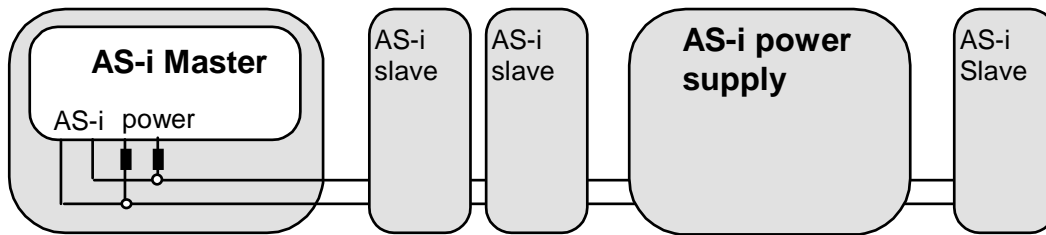


### 4.1.3 Connecting the AS-i Circuit

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 gateway are several light-emitting diodes, a three-digit seven-segment display and two push buttons to configure the gateway.

### 4.2.1 LEDs

D LED (green).

on:	BUS is active
flashes (0,5 Hz):	BUS not active
flashes (2 Hz):	BUS active, peripheral fault
flashes (4 Hz):	terminal in front of the module failed
off:	no logic power supply, BUS 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 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 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.

#### **4.2.2 Seven-Segment-Display**

The seven-segment-display shows slave addresses, errors and operations modes. See also chapter 12.

#### **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 Gateway for Inline

### 5.1 Master Start-Up

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

OFP Offline Phase

The AS-i master initializes - there is no data communication happening on the AS-i.



Attention

***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-up phase, in which 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<sup>1</sup> Activation Phase

End of the start-up operation when the parameters are transmitted to all connected and recognized slaves. This enables access to the AS-i slaves' data connections.

43<sup>2</sup> Start of 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.



Attention

***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.

If the display is empty, no slaves have been connected to the AS-i circuit.

In configuration mode, all recognized slaves are activated except for slave zero. The AS-i master is in normal operation. Data exchange between the AS-i master

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.

and all AS-i slaves has been detected by the master, regardless of whether the detected AS-i slaves have been projected before.



**Attention**

*When delivered the device is in configuration mode.*

### 5.3 Protected Operating Mode



**Note**

*Unlike the configuration mode, the protected mode allows data exchange between the AS-i master and the projected AS-i slaves only.*



**Attention**

*If there is no communication between the host and the AS-I master, the AS-i master clears the output data of all 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 saving 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 which 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 the 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" but-

ton. If a short AS-i power failure is responsible for the configuration error the display will show a "39".

## 5.4 Assigning an AS-i Address in Configuration Mode

To assign a slave with an address unequal zero to a different address unequal zero, please follow the following instructions in reverse order:

### 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 in succession. 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 flashes. The master is ready for programming; pressing the "SET" button again addresses the connected slave with address zero to the target (flashing address).

Any errors will be displayed by their error codes according to chapter 12. 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 address on the AS-i circuit, since this would cause malfunctions.*

### 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 in succession. By pressing the "SET" button repeatedly, the master will display the next available address. Pressing the button more than five seconds while the address of a detected slave is displayed, this slave will get the address zero and the display will show "0".

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 major advantages is the automatic address assignment. If a slave fails, it can be replaced by another one of the same type with the address zero. The master will detect the replacement and automatically address the new slave with the address of the faulty one.*

For automatic programming, the following requirements must be met:

1. The AS-i master must be in the protected operating mode.
2. The "Auto\_Address\_Assign"<sup>1</sup> 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 be assigned to the operating address of the missing slave. The "Automatic Address Assignment" can be activated and deactivated with the software "AS-i Control Tools".



**Note**

*Only slaves with address 0 can get a new address by the master, since this would cause malfunctions.*



**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.*

### 5.5.2 Manual Address Assignment



**Note**

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

In protected operating mode, wrong assignments are displayed as errors (see chapter 5.3). By pressing the "SET" button all faulty assignments will be displayed in succession. By pressing the "SET" button for more than five seconds the currently displayed address will be selected as a potential target address, and the display starts to flash.

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

1. By deleting the flag "Auto\_Address\_Assign", the user can deactivate "automatic addressing".

After the address has been successfully set, the next faulty assignment is displayed and the address assignment can be carried out again. Otherwise, the system displays an error code (chapter 12). When all faulty assignments are eliminated, the display will be 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 therefore outside the slave address range. These codes are described in the appendix, chapter 12.*

## 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.

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

The *LCS* contains the history of the delta list. Besides the list of projected slaves (*LPS*), the list of detected slaves (*LDS*) and the list of activated slaves (*LAS*), a fourth list, the **list of corrupted slaves (LCS)**, is being created by AS-i masters with advanced diagnostics in order to locate occasionally occurring short-time configuration errors. 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.*

### 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 increases every time a corrupted data telegram has been found. This makes possible to judge the quality of the AS-i network, even if only a few corrupted telegrams occurred 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 will cause a counter overflow.*

### 6.3 Offline Phase on Configuration Errors (LOS)

The AS-i master with advanced diagnostics offer the possibility to put themselves into the offline 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:

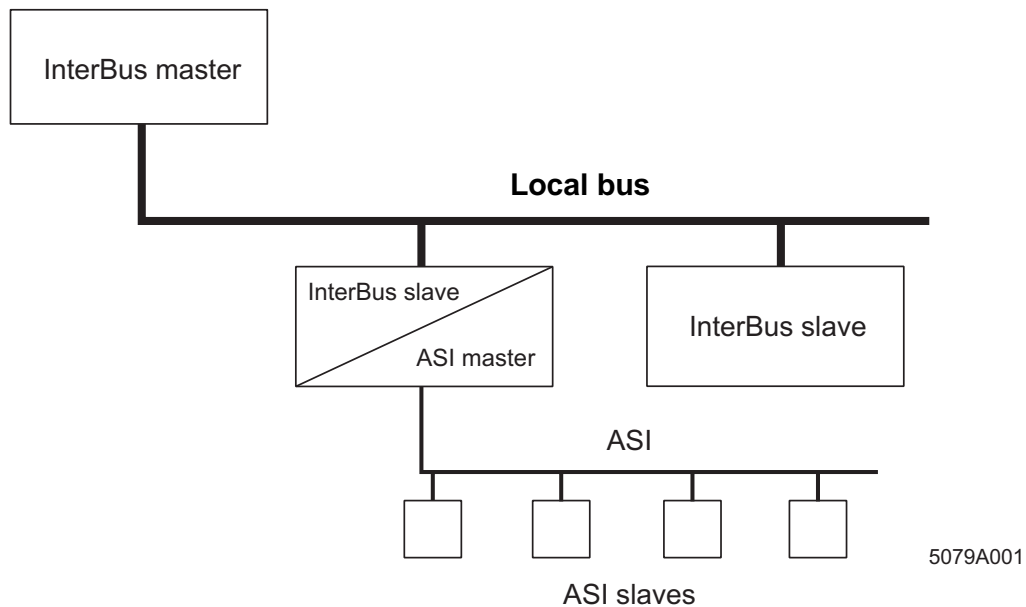
- Every configuration error during normal operation in protected mode releases the off-line phase.
- For each slave address, it can be chosen whether a configuration error on this address will cause the offline phase or not. This information is stored in the list of offline slaves (*LOS*).

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, whereas in less critical situations (if one of the other AS-i slaves has a configuration error) only the error message is sent to the host, but AS-i is still running.

## 7 AS-i Gateway for Inline

The primary task of the AS-i gateway for Inline 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 gateway for Inline 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 gateway for Inline 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 gateway for Inline 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 gateway for Inline 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)
--------------	--------------	------------------------



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.

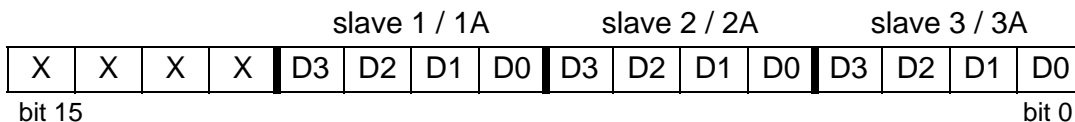
#### Note

### 7.1.1 Process Data Channel

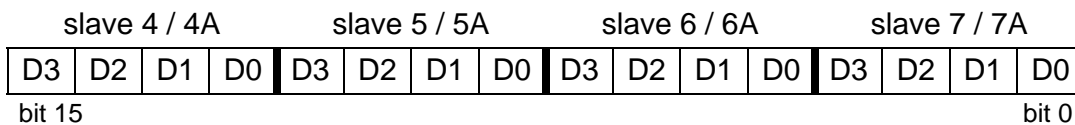
The process data channel transfers logical states directly between the programmable logic controller (PLC) and the digital actuators and sensors on the AS-i. INTERBUS and AS-i are thus invisible for machine programming, i. e. there is no difference with conventional parallel wiring for the INTERBUS master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

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

1st word



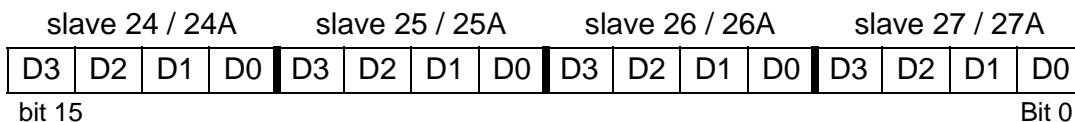
2nd word



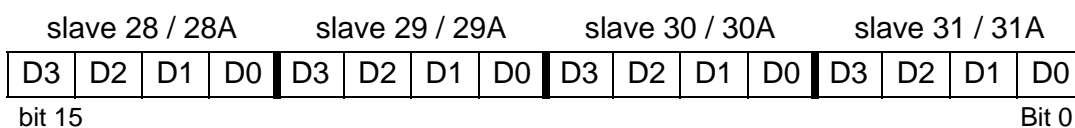
...

...

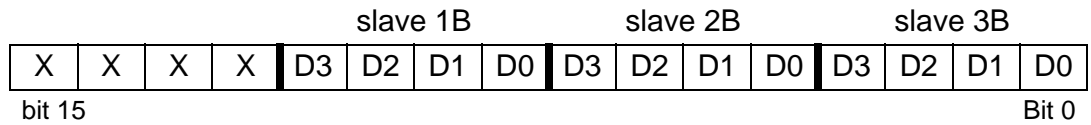
7th word



8th word

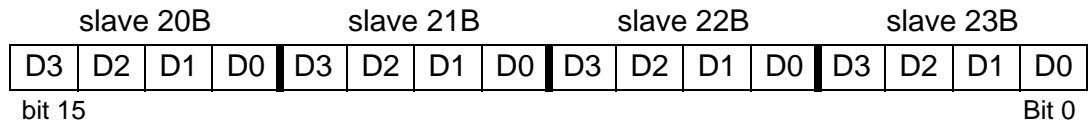


9th word



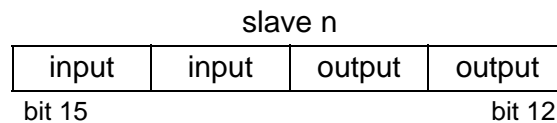
...  
...

14th word



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.:



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 gateway for Inline. It is not possible to access the data for slave 0, as this address is reserved for configuration mode.

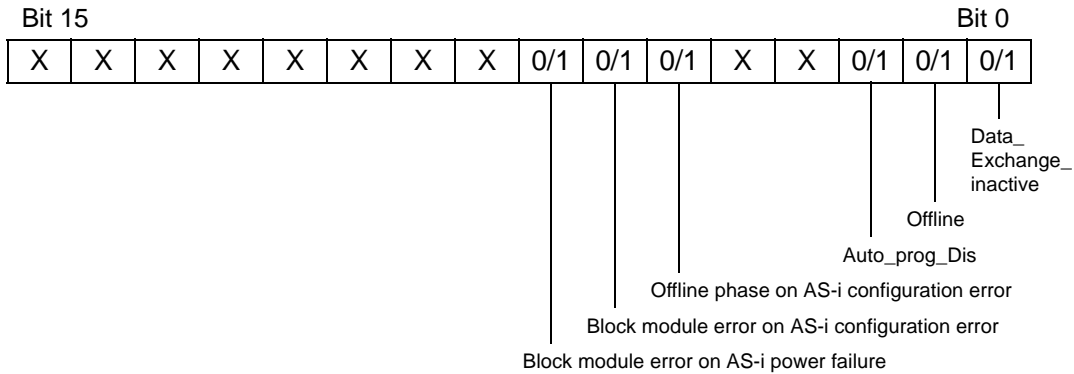
### 7.1.2 Control Word and Status Word

The INTERBUS master can use the control word to control the AS-i gateway for Inline. The status word indicates the current state of the AS-i gateway for Inline 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 gateway for Inline (bit set: active, bit reset: off):



Controlling 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 whether 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

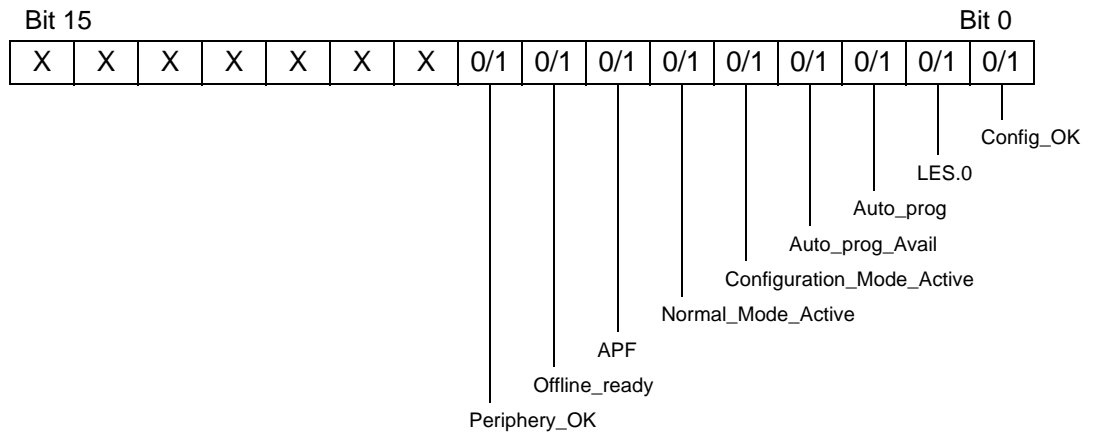
If this bit is 0 the blocking depends on the PCP-object 5FDA (stat-err).

### 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 gateway for Inline is in configuration mode.

### Normal\_Mode\_Active

The AS-i gateway for Inline is in normal mode, the AS-i cycle is running.

### APF

Voltage drop in the AS-i. In this event, the AS-i gateway for Inline 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 gateway for Inline through the control word and, following a voltage drop on the AS-i, the AS-i gateway for Inline 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 gateway for Inline 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 gateway for Inline communicates with the INTERBUS master in three ways, as described in section 3.1. In total, the AS-i gateway for Inline occupies according to the configuration 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 gateway for Inline 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 be 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 gateway for Inline;
- 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 gateway for Inline are shown in following tables, where xxd = decimal number and xxh means hexadecimal number.

<b>The most important data of the AS-i gateway for Inline for the programmer</b>	
ID code	223d /DFh (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

<b>Identification of the AS-i gateway for Inline as a virtual field device (VFD)</b>			
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 gateway for Inline provides the following PCP services:

<b>INTERBUS communications services of the AS-i gateway for Inline</b>			
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 gateway for Inline, with the WRITE service it can store it in the AS-i gateway for Inline. As a server, the AS-i gateway for Inline cannot initiate any read or write access.

The AS-i gateway for Inline 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 gateway for Inline supports access rights to communications objects, see Appendix.

### 7.2.4 Static PMS Data Types

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

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

<b>Description of the objects in the data type structure (DS) of the static object dictionary for the AS-i gateway for Inline</b>				
<b>Index</b>	<b>Object code</b>	<b>Number of Elements</b>	<b>Data-Type-Index</b>	<b>Length</b>
41h Configure_slave	DS	2	octet string octet string	1 1
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
49h block module errors	DS	2	bool bool	1 1

See chapter 8.3 for a description of the data structures.

The AS-i gateway for Inline 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 <sub>i</sub> (62 COs)	5F52-5F8F	simple variable	octet string (1)	Parameters for slave <sub>i</sub> (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)
Configure_slave <sub>i</sub> (62 COs)	5F94-5FD1	record	octet string (2) octet string (1)	Store configuration data of slave <sub>i</sub> (1*16) Store parameters of slave <sub>i</sub> (1*4)
Data transfer	FD2	record	boolean boolean boolean	Set/reset offline flag Set/reset DA flag Set/reset Auto_Prog_Disable
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
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)

Communication object	Index	Obj. type	Data type (length)	Content (length)
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)
Write command interface	601E	simple variable	octet string (36)	Command interface
Read command interface	601F	simple variable	octet string (36)	Command interface

See chapter 8.3 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.

Index (CO)	5F50 List of projected slaves (LPS)	5F51 Configuration mode	5F52-5F8F Parameterize_slaves <sub>i</sub>	5F90 Store_actual_parameters	5F91 Store_actual_configuration	5F91 Output data	601E Write command interface	601F Read command interface
Object code	simple variable							
Data type index	10	01	10	01	01	10	10	10
Length		1	1	1	1		36	36
Password	0	0	0	0	0	0	0	0
Access groups	0	0	0	0	0	0	0	0
Access-rights	Wa							
Local address	Implementation dependent							
Variable name	no entry							
Extension	no entry							

## Communication objects of the simple variable type:

Index (CO)	5F50 List of projected slaves (LPS)	5F51 Configuration mode	5F52-5F8F Parameterize_slave <sub>i</sub>	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 8.3 for a description of the data structures.

Communication object	Index	Content	Access	Process data imaging
Configure_slave <sub>i</sub> (62 COs)	5F94-5FD1	Stored configuration data for slave <sub>i</sub> Stored parameters for slave <sub>i</sub>	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_parameters (1 CO)	5FD4	Parameters field List of active slaves (LAS)	read read	not possible not possible
Parameterize_slave <sub>i</sub> (62 COs)	5F52-5F8F	Parameters for slave <sub>i</sub>	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
Write command interface	601E	Command interface	write	not possible
Read command interface	601F	Command interface	read	not possible

See chapter 8.3 for a description of the data structures.

Object description of the AS-i gateway for Inline communication objects:

Index (CO)	5F94-5FD1 Configure_ slave <sub>i</sub>	5FD4 Read_ parameters	5FD5 Modify_ operating_ address	5FD6 Input data
Object code	record			
Data type index	41h	44h	45h	46h
Password	0	0	0	0
Access groups	0	0	0	0
Access rights	Wa	Ra	Wa	Ra
Variable name	no entry			
Extension	no entry			
Local address (1)	implementation dependent			
Local address (2)	implementation dependent			
Local address (3)	no entry	no entry	no entry	implementation dependent

See chapter 8.3 for a description of the data structures.

## 8 Parameter Data Channel (PCP)

### 8.1 Services Supported

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

INTERBUS communications services of the AS-i gateway for Inline:

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 gateway for Inline 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.

### 8.2 Communication Relationship List (CRL)

The communication relationship list on the AS-i gateway for Inline contains just one entry. The AS-i gateway for Inline has only one communication relationship to INTERBUS address 0. In other words: once the INTERBUS master has sent a request to the AS-i gateway for Inline, it must wait until it has received the confirmation. Only then may it send the next request. The AS-i gateway for Inline 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 gateway for Inline CRL
CR	0
Number of CRL entries	1
Symbol length	0
VFD pointer supported	false

CRL entries for the AS-i gateway for Inline:

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

### 8.3 Communication Objects for the AS-i Gateway for Inline

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

#### 8.3.1 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 gateway for Inline find additional slaves, the AS-i gateway for Inline 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.

### 8.3.2 Configuration Mode (index 5F51)

(WRITE, Data-Type-Index 01h)

This command is used to put the AS-i gateway for Inline into configuration mode.

- Configuration mode

Byte 0

0xFF/0x00 (true/false)
------------------------

00h (false) = configuration mode off (protected mode)

ffh (true) = configuration mode on

### 8.3.3 Parameterize Slave<sub>i</sub> (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<sub>i</sub>:

Byte 0 slave<sub>i</sub>

X	X	X	X	P3	P2	P1	P0
---	---	---	---	----	----	----	----

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

**8.3.4 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

**8.3.5 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

**8.3.6 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

### 8.3.7 Configure Slave<sub>i</sub> (index 5F94-5FD1)

(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 gateway for Inline. There this data is stored in non-volatile memory.

- configuration data of slave<sub>i</sub>

Byte 0, 1 slave<sub>i</sub>

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<sub>i</sub> to be stored:

Byte 2 slaves<sub>i</sub>

X	X	X	X	P3	P2	P1	P0
---	---	---	---	----	----	----	----

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

### 8.3.8 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.

### 8.3.9 Read Parameters (index 5FD4)

ID_3	ID_2	ID_1	ID_0	IO3	IO2	IO1	IO0
------	------	------	------	-----	-----	-----	-----

(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 gateway for Inline 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.

### 8.3.10 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

### 8.3.11 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
------	------	------	------	------	------	------	------

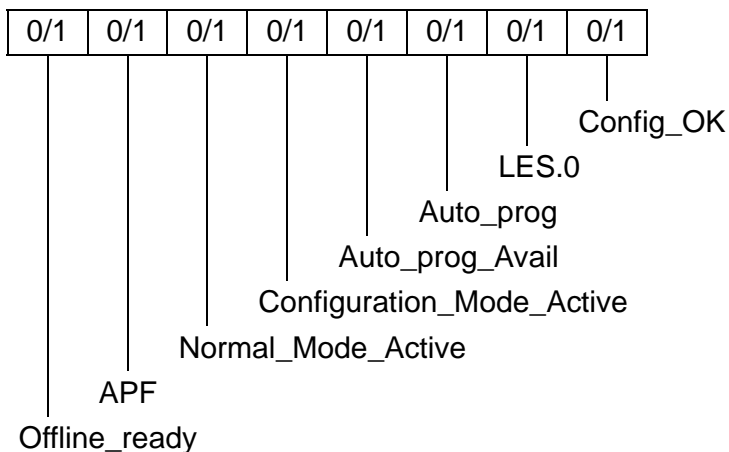
Byte 39 slaves 24B - 31B

S31B	S30B	S29B	S28B	S27B	S26B	S25B	S24B
------	------	------	------	------	------	------	------

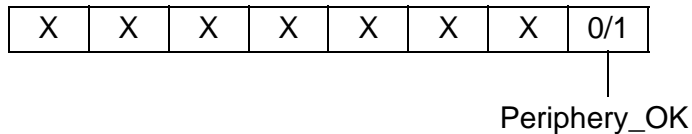
\*\*0": slave is not active,  
"1": slave is active.

- Status word

Byte 40



Byte 41

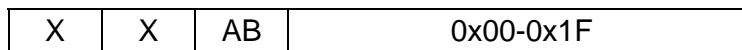
**8.3.12 Command Call (index 5FD7)**

(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

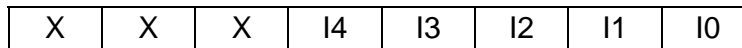


AB = 0      single slave or A-slave

AB = 1      B-slave

- command (information part)

Byte 1



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

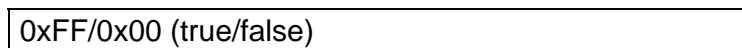
**8.3.13 Enable Process Output Data (index 5FD8)**

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

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

- Enable process output data via the parameter data channel:

Byte 0



0xFF      = Output data through PCP

0x00      = Output data through process data channel

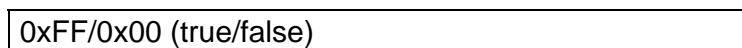
**8.3.14 Block the Module Errors (index 5FDA)**

(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



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

### 8.3.15 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.

**8.3.16 Write command interface**

(READ, WRITE, data type index 10)

The command interface is written with this command (see chapter 10).

**8.3.17 Read command interface**

(READ, data type index 0)

The command interface is read with this command (see chapter 10).

**8.4 Acknowledgements****8.4.1 Responses to the PCP Services**

The response of the AS-i gateway for Inline 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 troubleshooting in program development or indicate error situations in normal operation.

**8.5 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 8.3.7. 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

## 9 AS-i Protocol Implementation Conformance Statement (PICS)

No.	List of implemented Master functions	M1	Remark / Implemented by
<b>A</b>	<b>Functions or calls at host interface</b>		
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)	√	601E, 601F
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)	√	601E, 601F
10	Status = Store_Actual_Configuration ()	√	5F91
11	Status, S_Config = Read_Actual_Configuration (S_Addr)	√	601E, 601F
12	Status = Set_LPS (S_List)	√	5F50
13	Status, S_List = Get_LPS ()	√	601E, 601F
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_Address_Enable (Mode)	√	PD, 5F02
21.2	Mode = Get_Auto_Address_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>B</b>	<b>Integrated support of slave profile</b>		
1	Analog slave profile S7.3	√	5FFD ... 601B, 5F0C ... 5FFA
2	Analog slave profile S7.4	-	-

<b>Key</b>	
Symbol	Meaning
√	Function implemented
–	Function not implemented

## 10 Command Interface

### 10.1 Construction

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

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	command							
2	T	–	circuit					
3	request parameter byte 1							
...	...							

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	command							
2	T	result						
3	response parameter byte 1							
...	...							

The number of the circuit is defined as "0".

The commands for reading and writing exist in two variations. At the first variation the bits in the slave lists are arranged as usually with Phoenix Contact products: Data for slave with lower address appear in the lower bits. The second variation is compatible to Siemens masters: The sequence of the bits in the slave lists bytes are inverse.

Switching between the two variations can be done with bit  $2^6$  in byte 2 of the request. If it is deleted, the Phoenix Contact arrangement is selected, otherwise the Siemens compatible arrangement is selected.

The coding of requests for commands to reading and writing is following therefore:

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	command							
2	T	0	circuit					
3	Request parameter byte 1							
...	...							

### 10.1.1 List of all Commands

Values for command				
command	value	meaning	Req Len	Res Len
RD_7X_IN	50 <sub>16</sub>	Read 1 7.3-slave in.data	3	10
WR_7X_OUT	51 <sub>16</sub>	Write 1 7.3-slave out.data	11	2
RD_7X_OUT	52 <sub>16</sub>	Read 1 7.3-slave out.data	3	10
RD_7X_IN_X	53 <sub>16</sub>	Read 4 7.3-slaves in.data	3	
WR_7X_OUT_X	54 <sub>16</sub>	Write 4 7.3-slaves out.data	35	2
RD_7X_OUT_X	55 <sub>16</sub>	Read 4 7.3-slaves out.data	3	34
WR_74_PARAM	5A <sub>16</sub>	Write S-7.4-slave parameter	≥6	2
RD_74_PARAM	5B <sub>16</sub>	Read S-7.4-slave parameter	4	≥3
RD_74_ID	5C <sub>16</sub>	Read S-7.4-slave ID string	4	≥3
RD_74_DIAG	5D <sub>16</sub>	Read S-7.4-slave diagnosis string	4	≥3
GET_LISTS	30 <sub>16</sub>	Get LDS, LAS, LPS, Flags	2	29
GET_FLAGS	47 <sub>16</sub>	Get_Flags	2	5
GET_DELTA	57 <sub>16</sub>	Get list of config. diff.	2	10
GET_LCS	60 <sub>16</sub>	Get LCS	2	10
GET_LAS	45 <sub>16</sub>	Get_LAS	2	10
GET_LDS	46 <sub>16</sub>	Get_LDS	2	10
GET_LPF	3E <sub>16</sub>	Get_LPF	2	10
GET_LOS	61 <sub>16</sub>	GET_LOS	2	10
SET_LOS	62 <sub>16</sub>	SET_LOS	10	2
GET_TECA	63 <sub>16</sub>	Get transm.err.counters	2	34
GET_TECB	64 <sub>16</sub>	Get transm.err.counters	2	34
GET_TEC_X	66 <sub>16</sub>	Get transm.err.counters	4	≥3
SET_OP_MODE	0C <sub>16</sub>	Set_Operation_Mode	3	2
STORE_CDI	07 <sub>16</sub>	Store_Actual_Configuration	2	2
READ_CDI	28 <sub>16</sub>	Read_Actual_Configuration	3	4
SET_PCD	25 <sub>16</sub>	Set_Permanent_Config	5	2
GET_PCD	26 <sub>16</sub>	Get_Permanent_Config	3	4
SET_LPS	29 <sub>16</sub>	SET_LPS	11	2
GET_LPS	44 <sub>16</sub>	Get_LPS	2	10
STORE_PI	04 <sub>16</sub>	Store_Actual_Parameter	2	2
WRITE_P	02 <sub>16</sub>	Write_Parameter	4	3
READ_PI	03 <sub>16</sub>	Read_Parameter	3	3
SET_PP	43 <sub>16</sub>	Set_Permanent_Parameter	4	2
GET_PP	01 <sub>16</sub>	Get_Permanent_Parameter	3	3
SET_AAE	0B <sub>16</sub>	Set_Auto_Address_Enable	3	2
IDLE	00 <sub>16</sub>	No order	2	2

Values for command				
command	value	meaning	Req Len	Res Len
READ_IDI	41 <sub>16</sub>	Read IDI	2	36
WRITE_ODI	42 <sub>16</sub>	Write_ODI	34	2
READ_ODI	56 <sub>16</sub>	Read ODI	2	34
SLAVE_ADDR	0D <sub>16</sub>	Change_Slave_Address	4	2
WRITE_XID1	3F <sub>16</sub>	Write_Extended_ID-Code_1	3	2
SET_OFFLINE	0A <sub>16</sub>	Set_Offline_Mode	3	2
SET_DATA_EX	48 <sub>16</sub>	Set_Data_Exchange_Active	3	2
BUTTONS	75 <sub>16</sub>	Disable pushbuttons	3	2
FP_PARAM	7D <sub>16</sub>	„Functional Profile“ Param.	≥3	≥2
FP_DATA	7E <sub>16</sub>	„Functional Profile“ Data	≥3	≥2

### 10.1.2 Values for Results

Values for result			
	value	place	meaning
OK	00 <sub>16</sub>	–	execution without fault
HI_NG	11 <sub>16</sub>	HI	general fault
HI_OPCODE	12 <sub>16</sub>	HI	illegal value in command
HI_LENGTH	13 <sub>16</sub>	HI	length of the command interface is too short
HI_ACCESS	14 <sub>16</sub>	HI	no access right
EC_NG	21 <sub>16</sub>	EC	general fault
EC_SND	22 <sub>16</sub>	EC	"slave (source addr) not detected"
EC_SD0	23 <sub>16</sub>	EC	"slave 0 detected"
EC_SD2	24 <sub>16</sub>	EC	"slave (target addr) not detected"
EC_DE	25 <sub>16</sub>	EC	"delete error"
EC_SE	26 <sub>16</sub>	EC	"set error"
EC_AT	27 <sub>16</sub>	EC	"address temporary"
EC_ET	28 <sub>16</sub>	EC	"extended ID1 temporary"
EC_RE	29 <sub>16</sub>	EC	"read (extended ID1) error"

## 10.2 Commands of the Command Interface

### 10.2.1 Analog Data

#### 10.2.1.1 Overview of the Commands

Values for command				
command	value	meaning	Req Len	Res Len
RD_7X_IN	50 <sub>16</sub>	Read 1 7.3-slave in.data	3	10
WR_7X_OUT	51 <sub>16</sub>	Write 1 7.3-slave out.data	11	2
RD_7X_OUT	52 <sub>16</sub>	Read 1 7.3-slave out.data	3	10
RD_7X_IN_X	53 <sub>16</sub>	Read 4 7.3-slaves in.data	3	34
WR_7X_OUT_X	54 <sub>16</sub>	Write 4 7.3-slaves out.data	35	2
RD_7X_OUT_X	55 <sub>16</sub>	Read 4 7.3-slaves out.data	3	34
WR_74_PARAM	5A <sub>16</sub>	Write S-7.4-slave parameter	≥6	2
RD_74_PARAM	5B <sub>16</sub>	Read S-7.4-slave parameter	4	≥3
RD_74_ID	5C <sub>16</sub>	Read S-7.4-slave ID string	4	≥3
RD_74_DIAG	5D <sub>16</sub>	Read S-7.4-slave diagnosis string	4	≥3

#### 10.2.1.2 Read 1 7.3-Slave in.Data (RD\_7X\_IN)

With this command, the four 16 bit channels of an AS-i input slave according to the slave profile 7.3 can be read.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	50 <sub>16</sub>							
2	T	–	circuit					
3	–		0	slave address				

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	50 <sub>16</sub>							
2	T	result						
3	channel 1, high byte							
...	...							
10	channel 4, low byte							

**10.2.1.3 Write 1 7.3-Slave out.Data (WR\_7X\_OUT)**

With this command, the four 16 bit channels of an AS-i output slave according to the slave profile 7.3 can be written.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$51_{16}$							
2	T	-	circuit					
3	-		0	slave address				
4	channel 1, high byte							
...	...							
11	channel 4, low byte							

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$51_{16}$							
2	T	result						

**10.2.1.4 Read 1 7.3-Slave out.Data (RD\_7X\_OUT)**

With this command, the four 16 bit channels of an AS-i output slave according to the slave profile 7.3 can be read out of the AS-i gateway for Inline.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$52_{16}$							
2	T	-	circuit					
3	-		0	slave address				

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$52_{16}$							
2	T	result						
3	channel 1, high byte							
...	...							
10	channel 4, low byte							

**10.2.1.5 Read 4 7.3-Slave in.Data (RD\_7X\_IN\_X)**

With this command, the four 16 bit channels of 4 AS-i input slaves with successive addresses according to slave profile 7.3 can be read.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$53_{16}$							
2	T	–	circuit					
3	–		0	1st slave address				
Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$53_{16}$							
2	T	result						
3	1st slave, channel 1, high byte							
...	...							

**10.2.1.6 Write 4 7.3-Slave out.Data (WR\_7X\_OUT\_X)**

With this command the four 16 bit channels of four AS-i output slaves with successive addresses according to slave profile 7.3 can be written.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$54_{16}$							
2	T	–	circuit					
3	–		0	1st slave address				
4	1st slave, channel 1, high byte							
...	...							
Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$54_{16}$							
2	T	result						

**10.2.1.7 Read 4 7.3-Slave out.Data (RD\_7X\_OUT\_X)**

With this command, the four 16 bit channels of four AS-i output slaves with successive addresses according to slave profile 7.3 can be read.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$55_{16}$							
2	T	–	circuit					
3	–		0	1st slave address				

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	55 <sub>16</sub>							
2	T	result						
3	1st slave, channel 1, high byte							
...	...							

#### 10.2.1.8 WR\_74\_PARAM

With this function the parameter string of a slave according to profile S-7.4 is written. Since the string can be longer than the command interface, it will partly be written into the buffer and then be transferred to the slave.

n is the length of the part of the string which should be written into the buffer from index i on.

If  $i = 0$ , then the string is being transferred to the slave.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	5A <sub>16</sub>							
2	T	-	circuit					
3	slave address							
4	i							
5	n							
6	buffer byte i							
...	...							
n+5	buffer byte i+n-1							

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	5A <sub>16</sub>							
2	T	results						

#### 10.2.1.9 RD\_74\_PARAM

With this function the parameter string according to profile S-7.4 is being read. Since the string can be longer than the command interface, it is written into the buffer. The content of the buffer can read in parts from index i.

The first byte of the buffer is the length of the read string.

If  $i \equiv 0$ , the string is being read from the slave, otherwise the function responses out of the memory; the data can be read consistently.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$5B_{16}$							
2	T	-	circuit					
3	slave address							
4	i							

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$5B_{16}$							
2	T	result						
	buffer byte i							
...	...							
n+2	buffer byte i+n-1							

#### 10.2.1.10 RD\_74\_ID

With this function the ID string of a slave according to profile S-7.4 is being read. Since the string can be longer than the command interface, it is written into the buffer. The content of the buffer can read in parts from index i.

The first byte of the buffer is the length of the read string.

If  $i \equiv 0$ , the string is being read from the slave, otherwise the function responses out of the memory, the data can be read consistently.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$5C_{16}$							
2	T	-	circuit					
3	slave address							
4	i							

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$5C_{16}$							
2	T	result						
	buffer byte i							
...	...							
n+2	buffer byte i+n-1							

### 10.2.1.11 RD\_74\_DIAG

With this function the diagnosis string of a slave according to profile S-7.4 is being read. Since the string can be longer than the command interface, it is written into the buffer. The content of the buffer can be read in parts from index  $i$ .

The first byte of the buffer indicates the length of the read string.

If  $i \equiv 0$ , the string is being read from the slave, otherwise the function responses out of the memory, the data can be read consistently.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$5D_{16}$							
2	T	-	circuit					
3	slave address							
4	$i$							

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$5D_{16}$							
2	T	result						
	buffer byte $i$							
...	...							
$n+2$	buffer byte $i+n-1$							

## 10.2.2 Diagnosis Data

### 10.2.2.1 Overview of the Commands

Values for command				
Command	value	meaning	Req Len	Res Len
GET_LISTS	$30_{16}$	Get LDS, LAS, LPS, Flags	2	29
GET_FLAGS	$47_{16}$	Get_Flags	2	5
GET_DELTA	$57_{16}$	Get list of config. diff.	2	10
GET_LCS	$60_{16}$	Get LCS	2	10
GET_LAS	$45_{16}$	Get_LAS	2	10
GET_LDS	$46_{16}$	Get_LDS	2	10
GET_LPF	$3E_{16}$	Get_LPF	2	10
GET_LOS	$61_{16}$	GET_LOS	2	10
SET_LOS	$62_{16}$	SET_LOS	10	2
GET_TECA	$63_{16}$	Get transm.err.counters	2	34
GET_TECB	$64_{16}$	Get transm.err.counters	2	34
GET_TEC_X	$66_{16}$	Get transm.err.counters	4	34

### 10.2.2.2 Get Lists and Flags (Get\_LPS, Get\_LAS, Get\_LDS, Get\_Flags) (GET\_LISTS)

With this call, the following entries are read out of the AS-i gateway for Inline:

- The list of active AS-i slaves (LAS)
- The list of detected AS-i slaves (LDS)
- The list of projected AS-i slaves (LPS)
- The flags according to the AS-i slave specification

Request									
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>	
1	30 <sub>16</sub>								
2	T	O	circuit						

Response (if O ≡ 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	30 <sub>16</sub>							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	0A
...	LAS							
10	31B	30B	29B	28B	27B	26B	25B	24B
11	7A	6As	5A	4A	3A	2A	1A	0A
...	LDS							
19	31B	30B	29B	28B	27B	26B	25B	24B
20	7A	6As	5A	4A	3A	2A	1A	0A
...	LPS							

Response (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	30 <sub>16</sub>							
2	T	result						
3	0A	1A	2A	3A	4A	5A	6A	7A
...	LAS							
10	24B	25B	26B	27B	28B	29B	30B	31B
11	0A	1A	2A	3A	4A	5A	6A	7A
...	LDS							
19	24B	25B	26B	27B	28B	29B	30B	31B
20	0A	1A	2A	3A	4A	5A	6A	7A
...	LPS							

Pok Periphery\_Ok  
 S0 LDS.0  
 AAs Auto\_Address\_Assign

AAv Auto\_Address\_Available  
 CA Configuration\_Active  
 NA Normal\_Operation\_Active  
 APF APF  
 OR Offline\_Ready  
 Cok Config\_Ok  
 AAe Auto\_Address\_Enable  
 OL Offline  
 DX Data\_Exchange\_Active

### 10.2.2.3 Get Flags (GET\_FLAGS)

With this call, the following entry is read out of the AS-i gateway for Inline: The flags according to the AS-i slave specification.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	47 <sub>16</sub>							
2	T	–	circuit					
Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	47 <sub>16</sub>							
2	T	response						
3	–							Pok
4	OR	APF	NA	CA	AAv	AAs	S0	Cok
5	–					AAe	OL	DX

Pok Periphery\_Ok

This flag is set when no AS-i slave is signaling a peripheral fault.

S0 LDS.0

This flag is set when an AS-i slave with address 0 exists.

AAs Auto\_Address\_Assign

This flag is being set when the automatic address programming is possible (in other words, AUTO\_ADDR\_ENABLE = 1; no "incorrect" slave connected to the AS-i).

AAv Auto\_Address\_Available

This flag is set when the automatic address programming can be executed, exactly one AS-i slave is currently out of operation.

CA Configuration\_Active

The flag is set in configuration mode and reset in protected mode.

NA Normal\_Operation\_Active

This flag is set when the AS-i master is in normal operation.

APF AS-i Power Fail

This flag is set when the voltage on the AS-i cable is too low.

- OR Offline\_Ready  
The flag is set when the offline phase is active.
- Cok Config\_Ok  
This flag is set when the desired (configured) and actual configuration match.
- AAe Auto\_Address\_Enable  
This flag indicates whether the automatic address programming is enabled (bit = 1) or disabled (bit = 0) by the user.
- OL Offline  
This flag is set when the mode should be changed to OFFLINE or when this mode has already been reached.
- DX Data\_Exchange\_Active  
If the "Data\_Exchange\_Active" flag is set, the data exchange between AS-i master and slaves is available in the data exchange phase. If this bit is not set the data exchange is not available. The read ID telegrams are transmitted to the slave.  
The bit is set if the AS-i master enters the offline phase.

#### 10.2.2.4 Get Delta List (GET\_DELTA)

The delta list contains the list of slave addresses with configuration errors.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	57 <sub>16</sub>							
2	T	0	circuit					

Response (if O ≡ 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	57 <sub>16</sub>							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	–
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Response (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	57 <sub>16</sub>							
2	T	result						
3	0	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24B	25B	26B	27B	28B	29B	30B	31B

### 10.2.2.5 Get List of Corrupted Slaves (GET\_LCS)

The LCS contains the history of the delta list.

With this call, the List of Corrupted Slaves (*LCS*) is read out of the AS-i gateway for Inline.

Request									
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$	
1	$60_{16}$								
2	T	O	circuit						

Response (if $O \equiv 0$ )								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$60_{16}$							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	0A
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Response (if $O \equiv 1$ )								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$60_{16}$							
2	T	result						
3	0A	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24B	25B	26B	27B	28B	29B	30B	31B

### 10.2.2.6 Get List of Activated Slaves (GET\_LAS)

With this call, the following entry is read out of the AS-i gateway for Inline: The list of activated slaves (*LAS*).

Request									
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$	
1	$45_{16}$								
2	T	O	circuit						

Response (if $O \equiv 0$ )								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$45_{16}$							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	0A
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Response (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	45 <sub>16</sub>							
2	T	result						
3	0A	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24B	25B	26B	27B	28B	29B	30B	31B

#### 10.2.2.7 Get List of Detected AS-i slaves (GET\_LDS)

With this call, the following entry is read out of the AS-i gateway for Inline: The list of detected AS-i slaves (*LDS*).

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	46 <sub>16</sub>							
2	T	O	circuit					

Response (if O ≡ 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	46 <sub>16</sub>							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	0A
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Response (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	46 <sub>16</sub>							
2	T	result						
3	0A	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24B	25B	26B	27B	28B	29B	30B	31B

### 10.2.2.8 Get list of peripheral faults (GET\_LPF)

With this call, the list of peripheral faults (*LPF*) signaled by the AS-i slaves is read out from the AS-i master. The LPF is updated cyclically by the AS-i master. If and when an AS-i slave signals faults of the attached peripherals (for example broken wire) can be found in the description of the AS-i slave.

Request									
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>	
1	3E <sub>16</sub>								
2	T	O	circuit						

Response (if O = 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	3E <sub>16</sub>							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	0A
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Response (if O = 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	3E <sub>16</sub>							
2	T	result						
3	0A	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24B	25B	26B	27B	28B	29B	30B	31B

### 10.2.2.9 Get List of Offline Slaves (GET\_LOS)

With this call, the list of slaves causing the offline phase when a configuration error occurs in being read out (List of Offline Slaves, *LOS*).

The user can choose the reaction of the master when a configuration error occurs. The master can be switched off line when an important slave causes a configuration error; less important slaves can send an error to the host, AS-i however will not be switched offline.

Request									
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>	
1	61 <sub>16</sub>								
2	T	O	circuit						

Response (if O ≡ 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	6 <sub>16</sub> <sup>1</sup>							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	0A
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Response (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	6 <sub>16</sub> <sup>1</sup>							
2	T	result						
3	0A	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24B	25B	26B	27B	28B	29B	30B	31B

#### 10.2.2.10 Set List of Off-line Slaves (SET\_LOS)

With this call, the list of slaves causing the offline phase when a configuration error occurs in being defined (List of Offline Slaves, LOS).

The user can choose the reaction of the master when a configuration error occurs. The master can be switched offline when an important slave causes a configuration error; less important slaves can send an error to the host, AS-i however will not be switched offline.

Request (if O ≡ 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	6 <sub>16</sub> <sup>2</sup>							
2	T	O	circuit					
3	7A	6A	5A	4A	3A	2A	1A	0A
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Request (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	6 <sub>16</sub> <sup>2</sup>							
2	T	1	circuit					
3	0A	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24B	25B	26B	27B	28B	29B	30B	31B

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	62 <sub>16</sub>							
2	T	result						

#### 10.2.2.11 Get transm.err.counters (GET\_TECA)

With this call the error counters of all single slaves/A-slaves can be read (see chapter 6).

With every reading out of the counts, the error counters will be restarted.

The counts are being read out via the corresponding host interface and will be deleted with every read access. The counter's value is limited to 254. 255 will cause a counter overflow.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	63 <sub>16</sub>							
2	T	-	circuit					

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	63 <sub>16</sub>							
2	T	result						
3	APF							
4	slave 1A							
...	...							

#### 10.2.2.12 Get transm.err.counters (GET\_TECB)

With this call, the counts of the error counters for B-slaves are being read out (see chapter 6).

With every reading out of the counts, the error counters will be restarted.

The counts are being read out via the corresponding host interface and will be deleted with every read access. The counter's value is limited to 254. 255 will cause a counter overflow.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	64 <sub>16</sub>							
2	T	-	circuit					

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	64 <sub>16</sub>							
2	T	result						
3	APF							
4	slave 1B							
...	...							

### 10.2.2.13 GET\_TEC\_X

Beginning with a definite slave address, the counts of the n error counters are being read out with this call.

With every reading out the counts, the error counters will be restarted.

The counts are being read out via the correspondending host interface and will be deleted with every read access. The counter´s value is limited to 254. 255 will cause a counter overflow.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	66 <sub>16</sub>							
2	T	-	circuit					
3	1. slave address							
4	number of counters							

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	66 <sub>16</sub>							
2	T	result						
3	counter 1							
...	...							
n	counter n - 2							

### 10.2.2.14 Functional profiles

Further diagnosis functions for "Safety at Work" and for availability vice versa for warnings of integrated sensors are explained detailed in the chapter "Functional profiles" (chapter 10.2.3).

## 10.2.3 Functional profiles

### 10.2.3.1 "Safety at Work" List 1

Function: 00<sub>16</sub>

List of "safety-directed input slaves" ("AS-Interface Safety at Work"), whose safety function is released.

Safety-directed input slaves have the profile S-7.B or S-0.B (IO = 0 or 7, ID = B, see chapter 10.2.4.4: Read Actual Configuration).

The "Safety at Work" list 1 is a bit list which contains a bit for each possible slave address (1 - 31). This list is written in the bytes 5 until 8 in the response of the command of the command interface. Additionally, the response contains the ec-flags of the AS-Interface master in the bytes 3 and 4 (see chapter 10.2.2.3: "Get Flags").

The bits of the "Safety at Work" list 1 are set if the safety function of the slave is activated (e.g. emergency button pressed). The bit is only set at security slaves when both contacts are released, otherwise the bits have the value 0. "Normal" (non-security) slaves also have the value 0.

Since the security monitor is also being activated if a security slave is missing or if the AS-i circuit is shut off (offline active), the ec-flags will also be transmitted. It is sufficient however to monitor the group error message Cok (configuration error). As long as no configuration error, the list of the "safety-directed input slaves" can be used.

Configured safety slaves which are not available, and available slaves sending a wrong coder order, will not be entered in this list.

With the bit "O", the sequence of the bits within the "Safety at Work" list 1 can be chosen.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$7E_{16}$							
2	T	O	circuit					
3	$00_{16}$							

Response (if O = 0)								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$7E_{16}$							
2	T	result						
3	-							Pok
4	OR	APF	NA	CA	AAv	AAs	S0	Cok
5	7	6	5	4	3	2	1	-
6	15	14	13	12	11	10	9	8
7	23	22	21	20	19	18	17	16
8	31	30	29	28	27	26	25	25

Response (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	result						
3	-							Pok
4	OR	APF	NA	CA	AAv	AAs	S0	Cok
5	-	1	2	3	4	5	6	7
...	...							
8	24	25	26	27	28	29	30	31

Cok Config\_Ok

S0 LDS.0

AAs Auto\_Address\_Assign

AAv Auto\_Address\_Available

CA Configuration\_Active

NA Normal\_Operation\_Active

APF APF

OR Offline\_Ready

Pok Periphery\_Ok

#### Example for O ≡ 0:

Configuration OK,

periphery OK (no peripheral fault,

2 safety slaves with released safety function,

AS-Interface addresses 4 and 10

1 safety slave with unreleased safety function,

AS-Interface address 5.

Reponse: 7E 00 01 25 10 04 00 00

#### 10.2.3.2 "Safety at Work" Monitor Diagnosis

Function: 02<sub>16</sub>

Since the "Safety at Work" monitor can make more than 32 Byte diagnosis data, these must be read with several command interface calls. The second request byte declares the start index in the field of the diagnosis data.

If the start index ist 0, new data is fetched from the monitor. Otherwise, the function will respond out of the memory; the data can be read consistently.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	-	circuit					
3	02 <sub>16</sub>							
4	slave address							
5	index							

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	result						
3	diagnosis byte #index+0							
4	diagnosis byte #index+1							
...	...							
n	diagnosis byte #index+n-3							

The diagnosis data field of the safety monitor is structured as follows:

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
0	00 <sub>16</sub>							
1	monitor state							
2	state circuit 1							
3	state circuit 2							
4	number circuit 1							
5	number circuit 2							
6	device index 32, circuit 1							
7	device color, circuit 1							
8	device index 33, circuit 1							
9	device color, circuit 1							
...	...							
68	device index 63, circuit 1							
69	device color, circuit 1							
70	device index 32, circuit 2							
71	device color, circuit 2							
...	...							
132	device index 63, circuit 2							
133	device color, circuit 2							

### 10.2.3.3 Integrated AS-i Sensors: Warnings

Function: 03<sub>16</sub>

List of integrated AS-i sensors according to profile S-1.1 (without extended addressing) or profile S-3.A.1 (with extended addressing), by which the input data bit D1 ("Warning") being deleted.

For creating of this list CDI and IDI are used only. Integrated AS-i slaves which are projected but not existing therefore are not entered here.

Request									
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>	
1	7E <sub>16</sub>								
2	T	O	circuit						
3	03 <sub>16</sub>								

Response (if O ≡ 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	0
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Response if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	result						
3	0	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24A	25A	26A	27A	28A	29A	30A	31A

### 10.2.3.4 Integrated AS-i Sensors: Availability

Function: 04<sub>16</sub>

List of the integrated slaves according to profile S-1.1 whose input data bits D2 ("Availability") are deleted.

For creating this list, CDI and IDI are used only. Integrated AS-i slaves which are projected but not existing therefore are not entered here.

Request									
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>	
1	7E <sub>16</sub>								
2	T	O	circuit						
3	04 <sub>16</sub>								

Response (if O ≡ 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	result						
3	7	6	5	4	3	2	1	0
...	...							
6	31	30	29	28	27	26	25	24

Response (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	result						
3	0	1	2	3	4	5	6	7
...	...							
6	24	25	26	27	28	29	30	31

## 10.2.4 Configuration of the AS-i Master

### 10.2.4.1 Overview of the Commands

Values for command				
comamnd	value	meaning	Req Len	Res Len
SET_OP_MODE	0C <sub>16</sub>	Set_Operation_Mode	3	2
STORE_CDI	07 <sub>16</sub>	Store_Actual_Configuration	2	2
READ_CDI	28 <sub>16</sub>	Read_Actual_Configuration	3	4
SET_PCD	25 <sub>16</sub>	Set_Permanent_Config	5	2
GET_PCD	26 <sub>16</sub>	Get_Permanent_Config	3	4
SET_LPS	29 <sub>16</sub>	SET_LPS	11	2
GET_LPS	44 <sub>16</sub>	Get_LPS	2	10
STORE_PI	04 <sub>16</sub>	Store_Actual_Parameter	2	2
WRITE_P	02 <sub>16</sub>	Write_Parameter	4	3
READ_PI	03 <sub>16</sub>	Read_Parameter	3	3
SET_PP	43 <sub>16</sub>	Set_Permanent_Parameter	4	2
GET_PP	01 <sub>16</sub>	Get_Permanent_Parameter	3	3
SET_AAE	0B <sub>16</sub>	Set_Auto_Adress_Enable	3	2

#### 10.2.4.2 Set Operation Mode (SET\_OP\_MODE: Set\_Operation\_Mode)

This call switches between configuration mode and protected mode.

In protected mode, only AS-i slaves entered in the LPS and whose expected and actual configurations match, are being activated.

In other words: The slaves are being activated if the I/O configuration and the ID codes of the detected AS-i slaves are identical to the configured values.

In configuration mode, all detected AS-i slaves (except for AS-i slave "0") are activated. This also applies to AS-i slaves for which there are differences between the expected and actual configuration.

The "OPERATION MODE" bit is stored permanently; in other words, it is retained after a cold/warm restart.

When you change from configuration mode to protected mode, the AS-i master will do a warm restart (change to the offline phase followed by a change to the online mode).



*If an AS-i slave with address "0" is entered in the LDS, the AS-i gateway for Inline cannot change from configuration mode to protected mode.*

**Note**

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	0C <sub>16</sub>							
2	T	–	circuit					
3	operation mode							

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	0C <sub>16</sub>							
2	T	result						

Meaning of bit operation mode:

0 =protected mode

1 =configuration mode

#### 10.2.4.3 Store Actual Configuration (STORE\_CDI)

With this call, the (actual) configuration data (I/O configuration, ID code, extended ID1 code and extended ID2 code) of all AS-i slaves are stored permanently in the EEPROM as the (expected) configuration data. The list of activated AS-i slaves (LAS) is adopted in the list of permanent AS-i slaves (LPS).

When this command is executed, the AS-i master changes to the offline phase and then changes back to the normal mode (warm restart on the AS-i master).

This command can only be executed in the configuration mode.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	07 <sub>16</sub>							
2	T	–	circuit					

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	07 <sub>16</sub>							
2	T	result						

#### 10.2.4.4 Read Actual Configuration (READ\_CDI)

With this call, the following configuration data of an addressed AS-i slave obtained by the AS-i master on the AS-Interface are read.

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

The configuration data are specified by the manufacturer of the AS-i slave.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	28 <sub>16</sub>							
2	T	–	circuit					
3	–		B	slave address				

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	28 <sub>16</sub>							
2	T	result						
3	xID2				xID1			
4	ID				IO			

Meaning of bit B:

B = 0 Single AS-i slave or A-slave

B = 1 B-slave

#### 10.2.4.5 Set Permanent Configuration (SET\_PCD)

This call sets the following configuration data for the addressed AS-i slave:

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

The configuration data are stored permanently on the EEPROM of the AS-i gateway for Inline and are used as the expected configuration by the AS-i master in the protected mode. The configuration data are specified by the manufacturer of the AS-i slave.

If the addressed AS-i slave does not support an extended ID code 1/2, the value F<sub>hex</sub> must be specified.

When this command is executed, the AS-i master changes to the offline phase and then changes back to the normal mode (warm restart).

This command can only be executed in the configuration mode.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	25 <sub>16</sub>							
2	T	–	circuit					
3	–		B	slave address				
4	xID2				xID1			
5	ID				IO			

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	25 <sub>16</sub>							
2	T	result						

Meaning of bit B:

B = 0 Single AS-i slave or A-slave

B = 1 B-slave

#### 10.2.4.6 Get Extended Permanent Configuration (GET\_PCD)

This call reads the following configuration data (configured data) of an addressed AS-i slave stored on the EEPROM of the AS-i master:

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

The configuration data are specified by the manufacturer of the AS-i slave.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	26 <sub>16</sub>							
2	T	–	circuit					
3	–		B	slave address				

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	26 <sub>16</sub>							
2	T	result						
3	xID2				xID1			
4	ID				IO			

Meaning of bit B:

B = 0 Single AS-i slave or A-slave

B = 1 B-slave

#### 10.2.4.7 Set List of Projected Slaves (SET\_LPS)

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

When this command is executed, the AS-i master changes to the offline phase and then changes back to the normal mode (warm restart).

This command can only be executed in the configuration mode.

Request (if O ≡ 0)								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$29_{16}$							
2	T	0	circuit					
3	$00_{16}$							
4	7A	6A	5A	4A	3A	2A	1A	–
...	...							
11	31B	30B	29B	28B	27B	26B	25B	24B

Request (if O ≡ 1)								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$29_{16}$							
2	T	1	circuit					
3	$00_{16}$							
4	–	1A	2A	3A	4A	5A	6A	7A
...	...							
11	24B	25B	26B	27B	28B	29B	30B	31B

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$29_{16}$							
2	T	result						

#### 10.2.4.8 Get List of Projected Slaves (GET\_LPS)

With this call, the following entry is read out of the AS-i gateway for Inline: The list of projected AS-i slaves (LPS).

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$44_{16}$							
2	T	O	circuit					

Response (if O ≡ 0)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	44 <sub>16</sub>							
2	T	result						
3	7A	6A	5A	4A	3A	2A	1A	0A
...	...							
10	31B	30B	29B	28B	27B	26B	25B	24B

Response (if O ≡ 1)								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	44 <sub>16</sub>							
2	T	result						
3	0A	1A	2A	3A	4A	5A	6A	7A
...	...							
10	24B	25B	26B	27B	28B	29B	30B	31B

#### 10.2.4.9 Store Actual Parameters (STORE\_PI)

With this call, the configured parameters stored on the EEPROM are overwritten with the current, permanently stored (actual) parameters; in other words, the current parameters of all AS-i slaves are stored.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	04 <sub>16</sub>							
2	T	–	circuit					

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	04 <sub>16</sub>							
2	T	result						

### 10.2.4.10 Write Parameter (WRITE\_P)

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

The parameter is stored in the AS-i gateway for Inline only temporarily and is not stored as a configured parameter in the EEPROM!

The AS-i slave transfers its current parameter value in the response (parameter echo). This can deviate from the value that has just been written according to the AS-i master specification.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	02 <sub>16</sub>							
2	T	–	circuit					
3	–		B	slave address				
4	–			parameter				

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	02 <sub>16</sub>							
2	T	result						
3	–			slave response				

Meaning of bit B:

B = 0 Single AS-i slave or A-slave

B = 1 B-slave

### 10.2.4.11 Read Parameter (READ\_PI: Read\_Parameter)

This call returns the current parameter value (actual parameter) of an AS-i slave sent by the AS-i gateway for Inline. This value must not be confused with the parameter echo that is supplied by the AS-i slave as a response to the write\_p job.

This command can not be used for a directly reading of an AS-i parameter out of an AS-i slave.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	03 <sub>16</sub>							
2	T	–	circuit					
3	–		B	slave address				

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	03 <sub>16</sub>							
2	T	result						
3	–			PI				

Meaning of bit B:

B = 0 Single AS-i slave or A-slave

B = 1 B-slave

#### 10.2.4.12 Set\_Permanent\_Parameter (SET\_PP)

With this call, a parameter value for the specified AS-i slave is configured. The value is stored permanently in the EEPROM of the gateway.

The configured parameter value is transferred only when the AS-i slave is activated after turning on the power supply on the AS-i gateway for Inline.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$43_{16}$							
2	T	–	circuit					
3	–		B	slave address				
4	–				PP			
Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$43_{16}$							
2	T	result						

#### 10.2.4.13 Get\_Permanent\_Parameter (GET\_PP)

With this call, a slave-specific parameter value stored on the EEPROM of the AS-i gateway for Inline is read.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$01_{16}$							
2	T	–	circuit					
3	–		B	slave address				
Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$01_{16}$							
2	T	result						
3	–				PP			

Meaning of bit B:

B = 0 Single AS-i slave or A-slave

B = 1 B-slave

#### 10.2.4.14 Set Auto Address Enable (SET\_AAE)

This call can enable or disable the "automatic address programming" function. The AUTO\_ADDR\_ENABLE bit is stored permanently; in other words, it is retained after a warm/hot restart on the AS-i master.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	0B <sub>16</sub>							
2	T	-	circuit					
3	Auto_Address_Enable							

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	0B <sub>16</sub>							
2	T	result						

### 10.2.5 Other Commands

#### 10.2.5.1 Overview of the Commands

Value for command				
command	value	meaning	Req Len	Res Len
IDLE	00 <sub>16</sub>	Kein Auftrag	2	2
READ_IDI	41 <sub>16</sub>	Read IDI	2	36
WRITE_ODI	42 <sub>16</sub>	Write_ODI	34	2
READ_ODI	56 <sub>16</sub>	Read ODI	2	34
SLAVE_ADDR	0D <sub>16</sub>	Change_Slave_Address	4	2
WRITE_XID1	3F <sub>16</sub>	Write_Extended_ID-Code_1	3	2
SET_OFFLINE	0A <sub>16</sub>	Set_Off-Line_Mode	3	2
SET_DATA_EX	48 <sub>16</sub>	Set_Data_Exchange_Active	3	2
BUTTONS	75 <sub>16</sub>	Disable Pushbuttons	3	2
FP_PARAM	7D <sub>16</sub>	„Functional Profile“ Param.	≥3	≥2
FP_DATA	7E <sub>16</sub>	„Functional Profile“ Data	≥3	≥2

#### 10.2.5.2 IDLE

When the value of "command" is zero, no request will be fulfilled.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	00 <sub>16</sub>							
2	T	-	circuit					

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	00 <sub>16</sub>							
2	T	result						

### 10.2.5.3 Read Input Data Image (READ\_IDI)

With this call, the input data values of all AS-i slaves are read out of the AS-i gateway for Inline in addition to the cyclic data exchange. Though the command READ\_IDI transmits all execution control flags (byte 3 and byte 4).

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	41 <sub>16</sub>							
2	T	–	circuit					

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	41 <sub>16</sub>							
2	T	result						
3	–							Pok
4	OR	APF	NA	CA	AAv	AAs	s0	Cok
5	–				slave 1A			
6	slave 2A				slave 3A			
...	...							

Pok Periphery\_Ok  
 S0 LDS.0  
 AAs Auto\_Address\_Assign  
 AAv Auto\_Address\_Available  
 CA Configuration\_Active  
 NA Normal\_Operation\_Active  
 APF APF  
 OR Offline\_Ready  
 Cok Config\_Ok

#### 10.2.5.4 Write Output Data Image (WRITE\_ODI)

With this call the output data values of all AS-i slaves are written in addition to the cyclic data exchange.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$42_{16}$							
2	T	-	circuit					
3	-			slave 1A				
4	slave 2A			slave 3A				
...	...							

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$42_{16}$							
2	T	result						

#### 10.2.5.5 Read Output Data Image (READ\_ODI)

With this call, the output data values of all AS-i slaves is being read out of the AS-i gateway for Inline.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$56_{16}$							
2	T	-	circuit					

Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	$56_{16}$							
2	T	result						
3	-			slave 1A				
	slave 2A			slave 3A				
...	...							

#### 10.2.5.6 Change Slave Address (SLAVE\_ADDR)

With this call, the AS-i address of an AS-i slave can be modified.

This call is mainly used to add a new AS-i slave with the default address "0" to the AS-Interface. In this case, the address is changed from "AS-i slave address old" = 0 to "AS-i slave address new".

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

1. An AS-i slave with "AS-i slave address old" exists.
2. If the old AS-i slave address is not equal to 0, an AS-i slave with address "0" cannot be connected at the same time.

3. The "AS-i slave address new" must have a valid value.
4. An AS-i slave with "AS-i slave address new" must not exist.



*When the AS-i slave address is changed, the AS-i slave is not reset, in other words, the output data of the AS-i slave are retained until new data are received at the new address.*

**Note**

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	0D <sub>16</sub>							
2	T	–	circuit					
3	–		B	source address				
4	–		B	target address				

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	0D <sub>16</sub>							
2	T	result						

Meaning of bit B:

B = 0 Single AS-i slave or A-slave

B = 1 B-slave

#### 10.2.5.7 Write AS-i Slave Extended ID1 (WRITE\_XID1)

With this call, the extended ID1 code of an AS-i slave with address "0" can be written directly via the AS-i cable. The call is intended for diagnostic purposes and is not required in the normal master mode.

The AS-i master passes the extended ID1 code on to the AS-i slave without any plausibility check.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	3F <sub>16</sub>							
2	T	–	circuit					
3	–				xID1			

Response								
Byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	3F <sub>16</sub>							
2	T	result						

### 10.2.5.8 Set Offline Mode (SET\_OFFLINE)

This call switches between online and offline mode.

The online mode is the normal operating state for the AS-i master. The following jobs are processed cyclically:

- During the data exchange phase, the fields of the output data are transferred to the slave outputs for all AS-i slaves in the LAS. The addressed AS-i slaves submit the values of the slave inputs to the master when the transfer was free of errors.
- This is followed by the inclusion phase in which existing AS-i slaves are searched and newly added AS-i slaves are entered in the LDS or LAS.
- In the management phase, jobs by the user such as writing parameters are executed.

In the offline mode, the AS-i gateway for Inline processes jobs by the user only. (Jobs that involve the immediate addressing of an AS-i slave are rejected with an error). There is no cyclic data exchange with the AS-i slaves.

When offline, the AS-i circuit is in a safe state.

The OFFLINE = TRUE bit is not permanently stored; in other words, following a cold/warm restart, the AS-i gateway for Inline is once again in the online mode.

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	0A <sub>16</sub>							
2	T	–	circuit					
3	Off-Line							

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	0A <sub>16</sub>							
2	T	result						

The master changes to the offline phase, if there is a 1 written in byte 3.

The master will change to online mode if there is a 0 written in byte 3.

**10.2.5.9 Release Data Exchange (SET\_DATA\_EX)**

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	48 <sub>16</sub>							
2	T	-	circuit					
3	Data_Exchange_Active							
Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	48 <sub>16</sub>							
2	T	result						

**10.2.5.10 BUTTONS**

With this call, the use of the buttons can be enabled/disabled.

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	75 <sub>16</sub>							
2	T	-	circuit					
3	ButtonsDisabled							
Response								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	75 <sub>16</sub>							
2	T	result						

**10.2.5.11 FP\_PARAM**

This command is used for parametrization of "functional profiles".

The content of the request and response bytes depends on the called function (see chapter 10.2.3).

Request								
byte	$2^7$	$2^6$	$2^5$	$2^4$	$2^3$	$2^2$	$2^1$	$2^0$
1	7D <sub>16</sub>							
2	T	-	circuit					
3	function							
4	request byte 1							
...	...							
n	request byte n-3							

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7D <sub>16</sub>							
2	T	result						
3	response byte 1							
...	...							
n	response byte n-2							

#### 10.2.5.12 FP\_DATA

This command is used for the data exchange with "functional profiles".

The content of the request and response bytes depends on the called function (see chapter 10.2.3).

Request								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	-	circuit					
3	function							
4	request byte 1							
...	...							
n	request byte n-3							

Response								
byte	2 <sup>7</sup>	2 <sup>6</sup>	2 <sup>5</sup>	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2 <sup>0</sup>
1	7E <sub>16</sub>							
2	T	result						
3	response byte 1							
...	...							
n	response byte n-2							

## 10.3 Command Interface Examples

### 10.3.1 Reading Analog Input Values

Command RD\_7X\_IN: Reading of analog input values.

Meaning of the bytes:

Request: RD_7X_IN	
Byte 1	50 <sub>hex</sub> (RD_7X_IN)
Byte 2	00 <sub>hex</sub> (master 1, single master)
Byte 3	1D <sub>hex</sub> (slave address 29)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Response	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
Byte 3	00 <sub>hex</sub> (or old values)
Byte 4	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

The call of the command interface has not been answered with the valid values since the toggle bit has not been set.

Set of toggle bit:

Request	
Byte 1	50 <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (toggle bit, result)
Byte 3	1D <sub>hex</sub> (slave address 29)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Result: see chapter 10.1.2 "Values for Results"

Response	
Byte 1	50 <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (toggle bit, master1)
Byte 3	analog channel 1 high byte <sub>hex</sub>
Byte 4	analog channel 1 low byte <sub>hex</sub>
Byte 5	analog channel 2 high byte <sub>hex</sub>
Byte 6	analog channel 2 low byte <sub>hex</sub>
Byte 7	analog channel 3 high byte <sub>hex</sub>
Byte 8	analog channel 3 low byte <sub>hex</sub>
Byte 9	analog channel 4 high byte <sub>hex</sub>
Byte 10	analog channel 4 low byte <sub>hex</sub>
Byte 11	00 <sub>hex</sub> not usedt
...	...
Byte 36	00 <sub>hex</sub> not usedt

To get the input data again, the T-bit has to be reset again.

### 10.3.2 Store Current Configuration to the AS-i Master

1. Switch master to configuration mode
2. Write the current slave configuration to the master
3. Switch master to protected mode
4. Wait until master is in normal (protected) operation mode

36 Byte Management

#### 1. Switch master to config mode

Request: SET_OP_MODE	
Byte 1	0C <sub>hex</sub> (SET_OP_MODE)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	01 <sub>hex</sub> (= config mode)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Response	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Set the Toggle Bit:

<b>Request: SET_OP_MODE</b>	
Byte 1	0C <sub>hex</sub> (SET_OP_MODE)
Byte 2	80 <sub>hex</sub> (T = 1, master 1, single master)
Byte 3	01 <sub>hex</sub> (= config mode)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	0C <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)
Byte 3	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

Master is now in configuration mode.

Result = 0 ⇒ No error, for other result codes see chapter 10.1.2 "Values for Results".

2. Write the actual slave configuration to the master

<b>Request: STORE_CDI</b>	
Byte 1	07 <sub>hex</sub> (STORE_CDI)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Set the toggle bit:

<b>Request: STORE_CDI</b>	
Byte 1	07 <sub>hex</sub> (STORE_CDI)
Byte 2	80 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	00 <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)
Byte 3	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

The current configuration data has been written.

### 3. Set master to protected mode

<b>Request: SET_OP_MODE</b>	
Byte 1	0C <sub>hex</sub> (SET_OP_MODE)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub> (= Protected mode)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Set the toggle bit:

<b>Request: SET_OP_MODE</b>	
Byte 1	0C <sub>hex</sub> (SET_OP_MODE)
Byte 2	80 <sub>hex</sub> (T = 1, master 1, single master)
Byte 3	00 <sub>hex</sub> (= protected mode)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	0C <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)
Byte 3	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

The master has now been ordered to switch to protected mode. It must be waited until the master is switching in this operation mode.

#### 4.Wait until master is in normal operation mode (and protected mode)

Reading out the flags until NA (Normal Operation Active) has been set.

<b>Request: GET_FLAGS</b>	
Byte 1	47 <sub>hex</sub> (GET_FLAGS)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Setting the toggle bit:

Request: GET_FLAGS	
Byte 1	47 <sub>hex</sub> (GET_FLAGS)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub>
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Response								
Byte 1	47 <sub>hex</sub>							
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)							
Byte 3	-	-	-	-	-	-	-	POK
Byte 4	OR	APF	NA	CA	AAv	AAs	S0	COK
Byte 5						AAe	OL	DX
Byte 6	00 <sub>hex</sub>							
...								
Byte 36	00 <sub>hex</sub>							

The flag NA has to be set before the application is started. In case it is not set, the flags have to be read out until this flag has been set to 1.

The flag NA indicates that the master is in normal operation mode.

Normal operation mode is necessary to run the application safely.

### 10.3.3 Store New Configuration for all Slaves

1. Switch master in configuration mode
2. Write slave configuration to master
3. Write new list of projected slaves (*LPS*)
4. Write permanent parameter (*PP*) to master
5. Switch master to protected mode
6. Wait until master is in normal operation Mode (and protected mode)

#### 36 Byte Management

##### 1. Set master in config mode

Request: SET_OP_MODE	
Byte 1	0C <sub>hex</sub> (SET_OP_MODE)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	01 <sub>hex</sub> (= config mode)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Response	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
Byte 3	00 <sub>hex</sub> (or old values)
Byte 4	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Set the toggle bit:

Request: SET_OP_MODE	
Byte 1	0C <sub>hex</sub> (SET_OP_MODE)
Byte 2	80 <sub>hex</sub> (T = 1, master 1, single master)
Byte 3	01 <sub>hex</sub> (= config mode)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Response	
Byte 1	0C <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)
Byte 3	00 <sub>hex</sub> (or old values)
Byte 4	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

The master is now in configuration mode.

Result: see chapter 10.1.2 "Values for Results".

## 2. Write single configuration to master

Writing a configuration of an AS-i slave to the master.

For example:

Analog input 4 CH at address 4 (Slave datasheet)

ID: 3<sub>hex</sub>

ID2: E<sub>hex</sub>

IO: 7<sub>hex</sub>

ID1: F<sub>hex</sub>

Request: SET_PCD	
Byte 1	25 <sub>hex</sub> (SET_PCD)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	04 <sub>hex</sub> (slave address to write to master)
Byte 4	EF <sub>hex</sub> (ID + IO to configurate)
Byte 5	37 <sub>hex</sub> (xID2 + xID1 to configurate)
Byte 6	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Response	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
Byte 3	00 <sub>hex</sub> (or old values)
Byte 4	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Set the toggle bit:

Request: SET_PCD	
Byte 1	0C <sub>hex</sub> (SET_PCD)
Byte 2	80 <sub>hex</sub> (T = 1, master 1, single master)
Byte 3	04 <sub>hex</sub> (slave address to write to master)
Byte 4	EF <sub>hex</sub> (ID + IO to configurate)
Byte 5	37 <sub>hex</sub> (ID + IO to configurate)
Byte 6	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Response	
Byte 1	25 <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)
Byte 3	00 <sub>hex</sub> (or old values)
Byte 4	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

The single slave configuration for the analog module is written.

This command must be repeated for all 31 A-slaves and all 31 B-slaves. If you don't connect a slave to an address, write F<sub>hex</sub> for ID, IO, ID1, ID2.

### 3. Write new list of projected slaves

Write the complete LPS of your AS-i circuit.

Every bit in the LPS corresponds to one slave after the following scheme:

Byte0/Bit 0:slave 0/0A - can not be set!

Byte1/Bit 1:slave 1/1A

...

Byte3/Bit 7:slave 31/31A

Byte4/Bit 0:slave 0B - can not be set!

Byte4/Bit 1:slave 1B

...

Byte7/Bit 7:slave 31B

The slave is projected if the bit is set.

Example above: Analog module at address 4 ⇒ Set bit 4/byte 0:

<b>Request: SET_LPS</b>	
Byte 1	29 <sub>hex</sub> (SET_LPS)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub>
Byte 4	10 <sub>hex</sub> (LDS byte 0)
Byte 5	00 <sub>hex</sub> (LDS byte 1)
...	...
Byte 11	00 <sub>hex</sub> (LDS byte 7)
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Setting the toggle bit:

<b>Request: SET_LPS</b>	
Byte 1	29 <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, master 1, single master)
Byte 3	00 <sub>hex</sub>
Byte 4	10 <sub>hex</sub> (LDS byte 0)
Byte 5	00 <sub>hex</sub> (LDS byte 1)
...	...
Byte 11	00 <sub>hex</sub> (LDS byte 7)
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	29 <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)
Byte 3	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

The new list of protected slaves (LPS) is written.

4. Write permanent parameter (power on parameter) to master

Example as above: Analog module at address 4 with PP = 07<sub>hex</sub>

<b>Request: SET_PP</b>	
Byte 1	43 <sub>hex</sub> (SET_PP)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	04 <sub>hex</sub> (slave address to write to master)
Byte 4	07 <sub>hex</sub> (PP to write (use low nibble))
Byte 5	00 <sub>hex</sub> (LDS byte 1)
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0

Setting the toggle bit:

<b>Request: SET_PP</b>	
Byte 1	43 <sub>hex</sub> (SET_PP)
Byte 2	80 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	04 <sub>hex</sub> (slave address to write to master)
Byte 4	07 <sub>hex</sub> (PP to write (use low nibble))
Byte 5	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	43 <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, Result = 0)
Byte 3	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

The permanent parameter for the analog module is written.

This command must be repeated for all 31 A-slaves and all 31 B-slaves. If you don't connect a slave to an address, write the default value to the master (F<sub>hex</sub>) as a permanent parameter.

5. Switch Master to Protected Mode

<b>Request: SET_OP_MODE</b>	
Byte 1	0C <sub>hex</sub> (SET_OP_MODE)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub> (= protected mode)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Setting the toggle bit:

<b>Request: SET_OP_MODE</b>	
Byte 1	0C <sub>hex</sub> (SET_OP_MODE)
Byte 2	80 <sub>hex</sub> (T = 1, master 1, single master)
Byte 3	00 <sub>hex</sub> (= protected mode)
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	0C <sub>hex</sub>
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)
Byte 3	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

The master has now been ordered to switch to protected mode.

6. Wait until master is in normal (protected) operation mode

Read out the flags, until the NA (Normal Operation Active) has been set.

<b>Request: GET_FLAGS</b>	
Byte 1	47 <sub>hex</sub> (GET_FLAGS)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

<b>Response</b>	
Byte 1	00 <sub>hex</sub> (or old values)
Byte 2	00 <sub>hex</sub> (or old values)
...	...
Byte 36	00 <sub>hex</sub> (or old values)

No result because toggle bit = 0.

Setting the toggle bit:

Request: GET_FLAGS	
Byte 1	47 <sub>hex</sub> (GET_FLAGS)
Byte 2	00 <sub>hex</sub> (T = 0, master 1, single master)
Byte 3	00 <sub>hex</sub>
Byte 4	00 <sub>hex</sub>
...	...
Byte 36	00 <sub>hex</sub>

Response								
Byte 1	47 <sub>hex</sub>							
Byte 2	80 <sub>hex</sub> (T = 1, result = 0)							
Byte 3	-	-	-	-	-	-	-	POK
Byte 4	OR	APF	NA	CA	AAv	AAs	S0	COK
Byte 5						AAe	OL	DX
Byte 6	00 <sub>hex</sub>							
...								
Byte 36	00 <sub>hex</sub>							

The flag NA has to be set before the application is started. In case it is not set, the flags have to be read out until this flag has been set to 1.

The flag NA indicates that the master is in normal operation mode.

Normal operation mode is necessary to run the application safely.

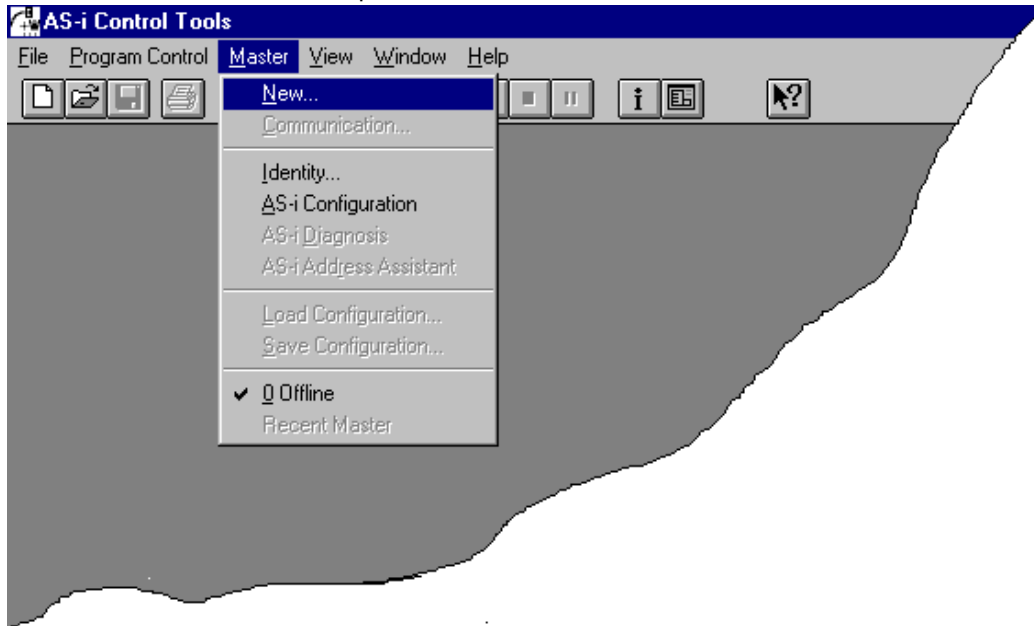
The flag NA indicates that the master is in the normal operating mode which is necessary for the application to run safely.

## 11 Commissioning Tools and Accessories

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

### 11.1 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.

Changing a slave address, setting AS-i parameters or AS-i configuration data is possible here. Additionally, inputs and outputs can be tested.

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.

Furthermore you can use the **AS-i Address Assistant**. This tool automatically changes the address of an AS-i slave to the desired address after connecting the slave to the AS-i line. The desired AS-i configuration can be created offline before and then be stored to a file. When building up the plant you only have to connect 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.

## 12 Appendix: Codes indicated by the Display

In the basic state of the configuration mode, the display shows the addresses of all detected slaves at a rate of two per second one after the other. A blank display indicates that the *LDS* is empty, 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 bigger than 31 which 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: After pressing the 'set'-button a short-time AS-i power failure occurred.
OFF	The AS-i master is in offline 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.
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 used.
92	Error while changing slave address: New address could not be set.
93	Error while changing slave address: New address could only be stored volatily in the slave.
94	Error while changing the 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 a superfluous slave (instead of a missing slave).

## 13 Appendix: The First Commissioning of AS-i



**Note**

*In this chapter an example is given, how quickly and easily an AS-i network can be put into operation 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 certainly is more comfortable to do the addressing with a handheld 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?
The AS-i master has to be 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 LC display shows "OFP": the AS-i master is in the offline 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 LC display shows "0". This indicates that the AS-i master has detected the slave.	
Change the slave address to address to "1".	Select address "1" by pressing the "SET" button shortly, if necessary repeatedly; after each pressing the next free address is displayed. When a "1" appears on the display, press the "SET" button for approx. five seconds until the display flashes. Press the "SET" button again shortly 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 can be carried out the same way as the previous slave.
The addresses of all detected slaves are now displayed sequentially.	
Switch 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.	

## 14 Technical Data

### Product Description

The AS-i gateway for Inline 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

### 14.1 AS-i Inline

Type	AS-i gateway for Inline
Product Number	27 36 62 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 (0 °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 sensors and actuators to Inline

### 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

## 15 Appendix: Data Format of the Process Data Channel

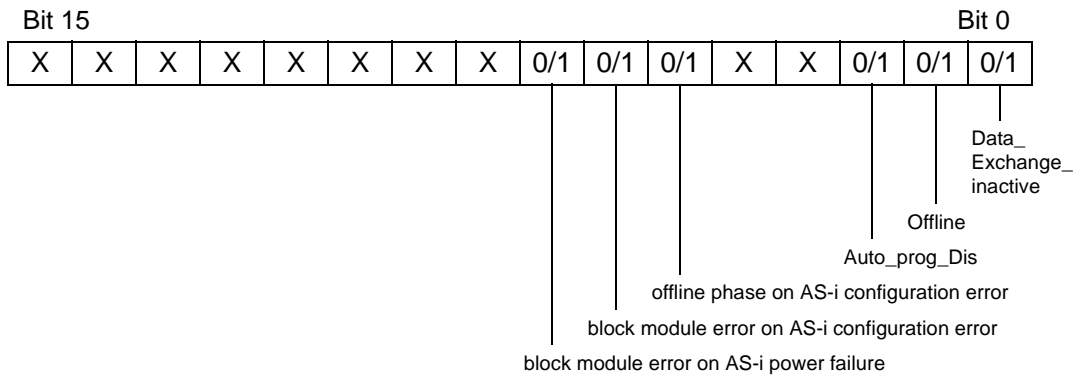


For the assignment of the (Word.Bit) or (Byte.Bit) view to the user set control or computer system, please refer to data sheet DB GB IBS SYS ADDRESS, Order No. 90 00 99 0.

Note

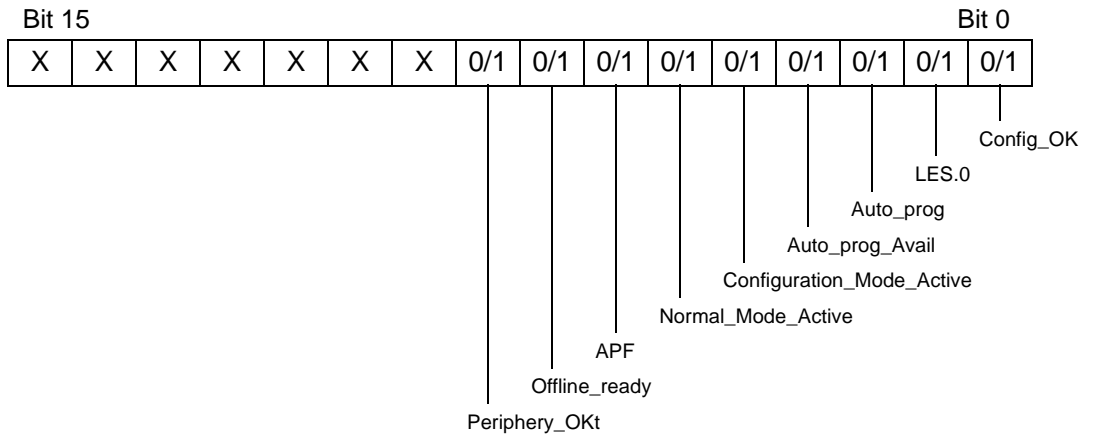
### 15.1 Control Word and Status Word

#### Control word from INTERBUS master to AS-i gateway for Inline



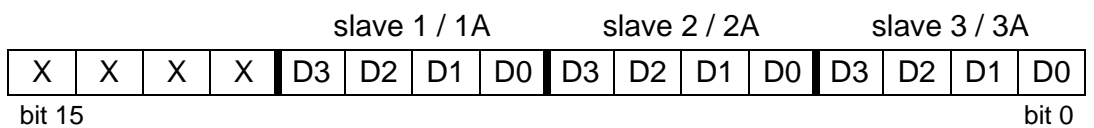
(bit set: active, bit deleted: off)

#### Status word from AS-i gateway for Inline to INTERBUS master

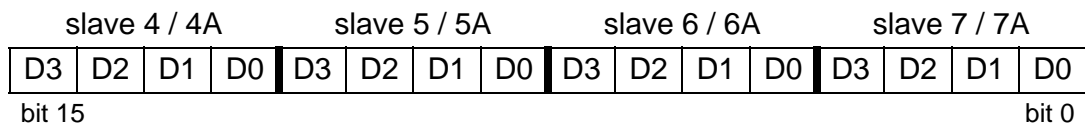


### 15.2 Inputs and Outputs of the Slaves

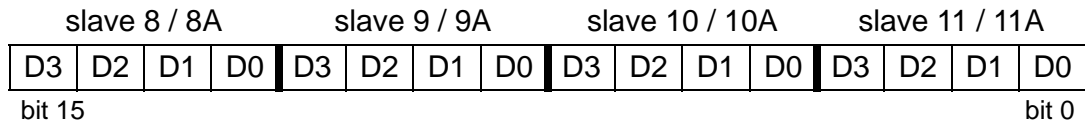
1st word



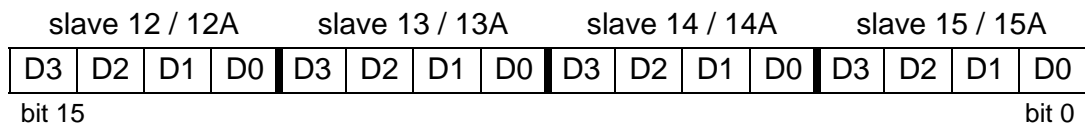
2nd word



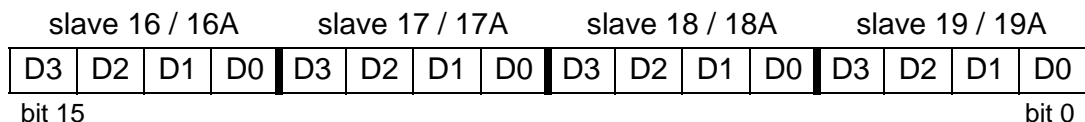
3rd word



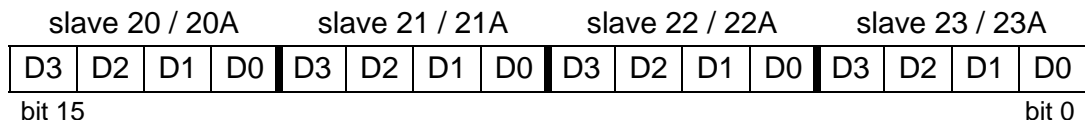
4th word



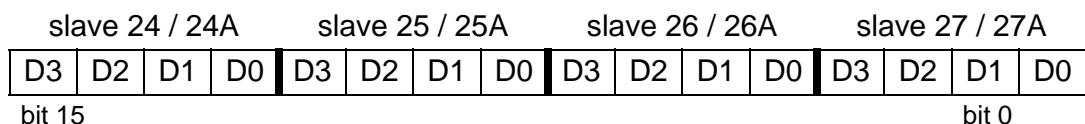
5th word



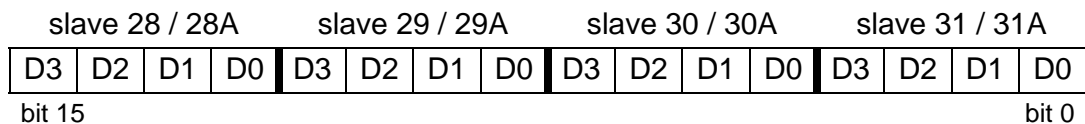
6th word



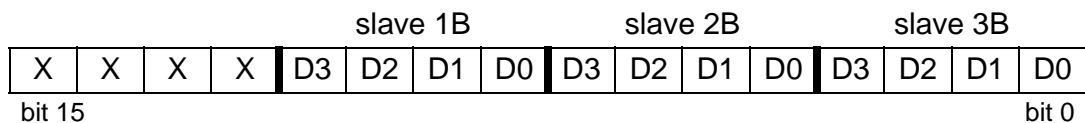
7th word



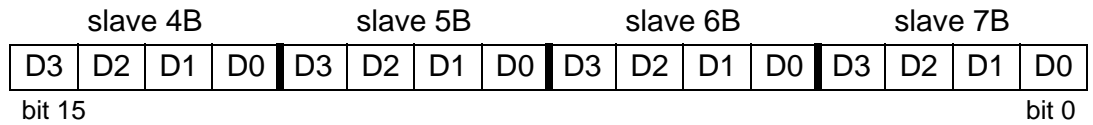
8th word



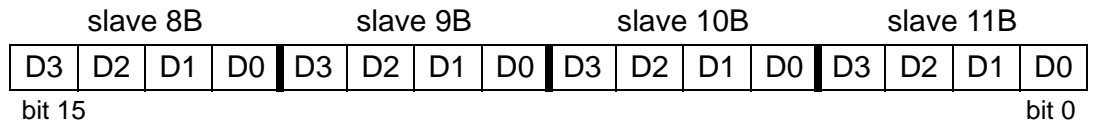
9th word



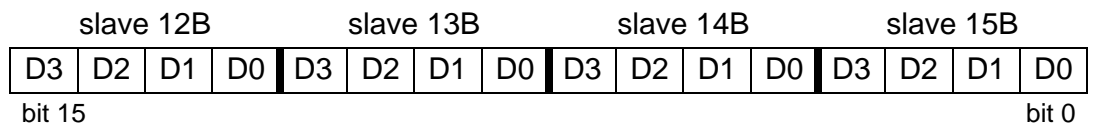
10th word



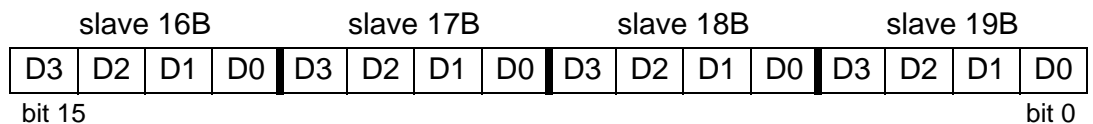
11th word



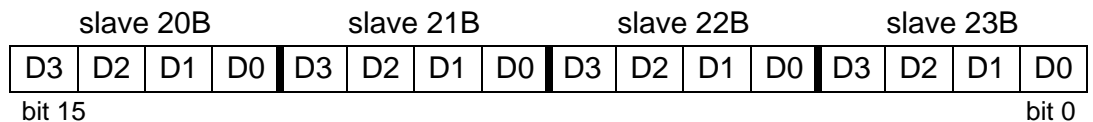
12th word



13th word



14th word



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	

### 15.3 Slave Lists of the AS-i Gateway for Inline

The AS-i gateway for Inline 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 gateway for Inline 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 gateway for Inline 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.

#### 15.3.1 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 addressing 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	

<b>OD-Header-Attribut</b>	<b>Belegung</b>	<b>Bemerkung</b>
S-OD length	73	
Local address S-OD	implementation dependent	
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.



## 16 We Are Interested in Your Opinion!

We would like to know 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:

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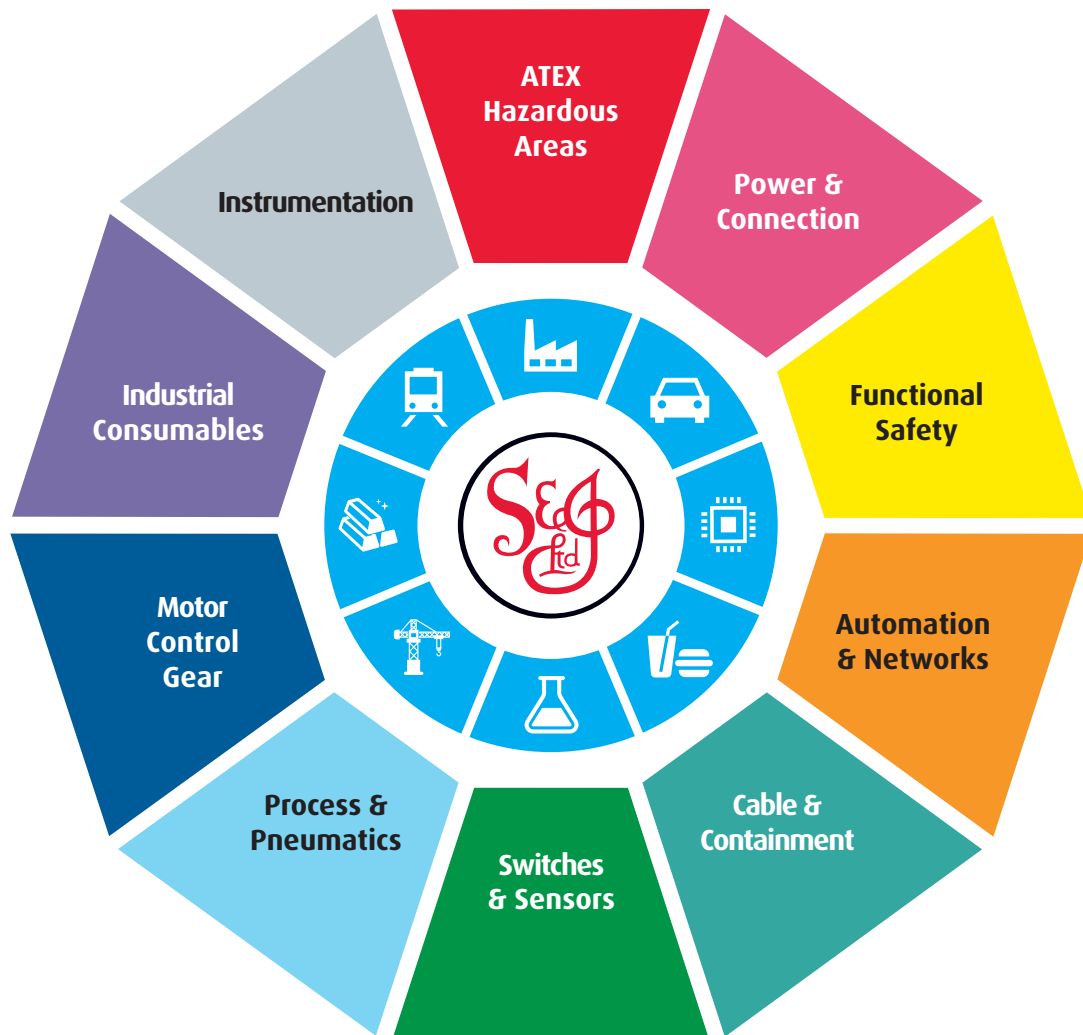
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