

Fieldbus Appendix **Anybus®-S CANopen**

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P. About This Document

P.1 How To Use This Document

This document is intended to be used as a supplement to the Anybus-S Parallel Design Guide. The reader of this document is expected to have basic knowledge in the CANopen fieldbus system, and communication systems in general. Please consult the general Anybus-S Parallel Design Guide for further information about the Anybus-S platform.

P.2 Important User Information

The data and illustrations found in this document are not binding. We, HMS Industrial Networks AB, reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and should not be considered as a commitment by HMS Industrial Networks AB. HMS Industrial Networks AB assumes no responsibility for any errors that may appear in this document.

There are many applications of this product. Those responsible for the use of this device must ensure that all the necessary steps have been taken to verify that the application meets all performance and safety requirements including any applicable laws, regulations, codes, and standards.

Anybus® is a registered trademark of HMS Industrial Networks AB. All other trademarks are the property of their respective holders.

The examples and illustrations in this document are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular implementation, HMS cannot assume responsibility or liability for actual use based on these examples and illustrations.

Warning:	This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.
ESD Note:	This product contains ESD (Electrostatic Discharge) sensitive parts that may be damaged if ESD control procedures are not followed. Static control precautions are required when handling the product. Failure to observe this may cause damage to the product.

P.3 Related Documents

Document name	Author
Anybus-S Parallel Design Guide	HMS
CiA Draft Standard 301 v4.02	CiA
	-

P.4 Document History

Summary of Recent Changes (v2.07... v2.10)

Change	Page(s)
Updated front page information	-
Updated sales and support information	4
Updated template	-
Corrected byte access tables for Input and Output buffers.	12, 15

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2.01	2005-08-25	PeP	All	Misc. minor updates & corrections
2.02	2006-01-11	PeP	C A 1	Merged chapters -> technical specification Added chapter 'Miscellaneous' Added Status LED
2.03	2007-04-02	PeP	A	Clarified watchdog timeout behaviour
2.04	2007-05-08	PeP	2 1	Corrected PDO mapping tables Corrected LED-indications
2.05	2008-05-19	PeP	B, 4	Minor update
2.06	2009-04-21	StK	4, 5	Minor update
2.07	2009-12-14	Kel	1, 2, 3, 4	Updates for new firmware revision
2.10	2011-08-26	KeL	All	New template, updates

P.5 Conventions & Terminology

The following conventions are used throughout this document:

- Numbered lists provide sequential steps
- Bulleted lists provide information, not procedural steps
- The term ‘module’ refers to the Anybus module
- The term ‘application’ refers to the device that hosts the Anybus module
- Hexadecimal values are written in the format NNNNh, where NNNN is the hexadecimal value.
- Commands instructs the module to perform certain task
- Functions are commands that returns data

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1. About the Anybus-S CANopen

1.1 General

The Anybus-S CANopen communication module provides instant CANopen connectivity via the patented Anybus-S application interface. Any device that supports this standard can take advantage of the features provided by the module, allowing seamless network integration regardless of network type.

This product conforms to all aspects of the parallel application interface defined in the Anybus-S Parallel Design Guide, making it fully interchangeable with any other device following that specification. Generally, very little network specific software support is needed, however in order to take advantage of advanced network specific functionality, a certain degree of dedicated software support may be necessary.

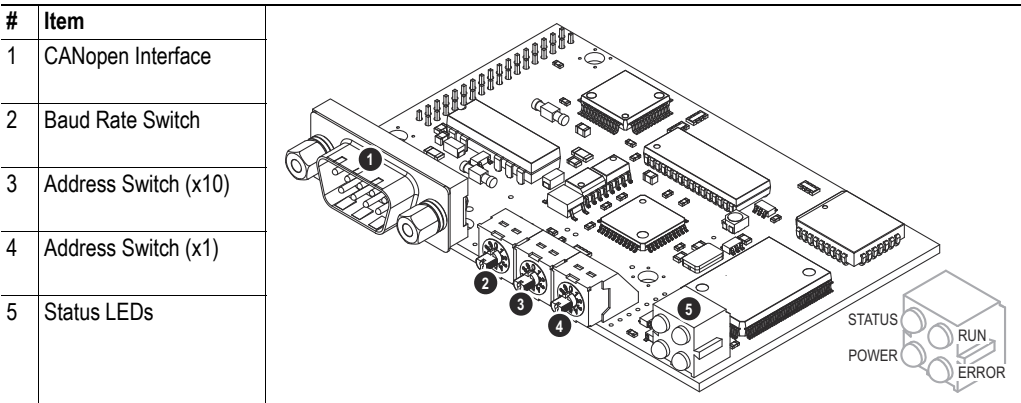
1.2 Features

- DS301 v4.02 compliant
- Backwards compatible with DS301 v3
- Application interface fully backwards compatible with ABS-COP-1 & 2.
- Galvanically isolated bus electronics
- Supports all standard baud rates
- Customizable Identity Information
- EMCY support
- Object access via application interface
- Customizable PDO mapping
- Transmission types: PDO Sync, Change-of-state, Event based, RTR
- Network store/restore functionality
- Heartbeat & Node Guarding support
- Up to 2048+2048 bytes of slow I/O
- Up to 80 RPDO's and 80 TPDO's

1.3 Fieldbus Conformance Notes

- This product is pre-certified for network compliance. While this is done to ensure that the final product *can* be certified, it does not necessarily mean that the final product doesn't need recertification. Contact HMS for further information.
- To ensure interoperability, the device identity information must be customized. CiA (CAN in Automation) members should apply for a unique Vendor ID, non-members may contact HMS to obtain a custom Product ID. Note however that a unique Vendor ID is required when certifying the final product.

1.4 Front View



Status LEDs

LED	State	Description
STATUS	Off	Normal operation
	Red	Unrecoverable fault detected
RUN	Off	Module not powered
	Green	Module is in the OPERATIONAL state
	Green, single flash	Module is in the STOPPED state
	Green, blinking	Module is in the PRE-OPERATIONAL state
	Red, blinking	Bus initialisation fault
POWER	Off	Module not powered
	Green	Module powered
ERROR	Off	No error
	Red	Bus off
	Red, single flash	Warning limit reached
	Red, double flash	Error Control Event
	Red, triple flash	Sync Error

CANopen Interface

This connector features a galvanically isolated CANopen interface.

The following connector types are supported:

- Male 9-pin D-sub (standard)
- Pluggable screw terminal (5.08mm)
- Pluggable screw terminal (3.84mm)
- 2mm board-to-board connector

For more information, see “Fieldbus Interface” on page 47.

Baud Rate Switch

(See “Address & Baud Rate Configuration” on page 7)

Address Switches

(See “Address & Baud Rate Configuration” on page 7)

2. Basic Operation

2.1 General Information

Software Requirements

Generally, no additional network support code needs to be written in order to support the Anybus-S CANopen; however in order to take advantage of advanced network specific functionality, a certain degree of dedicated software support may be necessary.

For further information about the Anybus-S software interface, consult the general Anybus-S Parallel Design Guide.

Electronic Data Sheet (EDS)

Each device on CANopen is associated with an Electronic Data Sheet (a.k.a .EDS-file), which holds a description of the device and its functions. Most importantly, the file describes the object dictionary implementation in the module.

HMS supplies a generic .EDS-file which can be used as a basis for new implementations. Note however that this file must be adjusted to fit the end product.

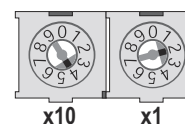
2.2 Address & Baud Rate Configuration

General

The CANopen baud rate and node address can be set either directly by the host application (see “Fieldbus Specific Initialisation (FB_INIT)” on page 20) or by using the onboard switches.

Address Switches

Two rotary switches provides an address range of 1...99 (a value of 0 is not allowed). In this example, the node address is set to 42 ($4 \times 10 + 2 \times 1$).



Baud Rate Switch

A single rotary switch selects the operating baud rate for the CANopen interface as follows:

Value	Baud Rate	Value	Baud Rate
0	(reserved, do not use)	5	250kbps
1	10kbps	6	500kbps
2	20kbps	7	800kbps
3	50kbps	8	1Mbps
4	125kbps	9	(reserved, do not use)

Note 1: The baud rate can't be changed during operation.

Note 2: It can be stored using the store command (1010h, sub index 01h), see 10.

2.3 Data Exchange

2.3.1 Parameter Data

The Anybus Input- and Output Data buffers are represented as object entries in the manufacturer specific range (2000h...5FFFh). Separate object ranges are used for byte, word, and double-word accesses.

2.3.2 I/O Data

I/O Data is exchanged using Process Data Objects (PDO). The Anybus module supports up to 80 RPDO's and 80 TPDO's, each capable of carrying up to 8 bytes of data.

Default PDO Mapping Scheme

The module features a simple default mapping scheme with 4 TPDO's and 4 RPDO's.

- RPDO

RPDO no.	Default COB IDs		Mapped to...	Default State
	Node ID 1... 63	Node ID >= 64		
1	200h + Node ID	200h + Node ID	Output Data buffer, bytes 0... 7	Enabled
2	300h + Node ID	300h + Node ID	Output Data buffer, bytes 8... 15	
3	400h + Node ID	400h + Node ID	Output Data buffer, bytes 16... 23	
4	500h + Node ID	500h + Node ID	Output Data buffer, bytes 24... 31	
5	240h + Node ID	580h	Output Data buffer, bytes 32... 39	Disabled
6	340h + Node ID	580h	Output Data buffer, bytes 40... 47	
7	440h + Node ID	580h	Output Data buffer, bytes 48... 55	
8	540h + Node ID	580h	Output Data buffer, bytes 56... 63	
9...80	500h	500h	-	Disabled

- TPDO

TPDO no.	Default COB IDs		Mapped to...	Default State
	Node ID 1... 63	Node ID >= 64		
1	180h + Node ID	180h + Node ID	Input Data buffer, bytes 0... 7	Enabled
2	280h + Node ID	280h + Node ID	Input Data buffer, bytes 8... 15	
3	380h + Node ID	380h + Node ID	Input Data buffer, bytes 16... 23	
4	480h + Node ID	480h + Node ID	Input Data buffer, bytes 24... 31	
5	1C0h + Node ID	500h	Input Data buffer, bytes 32... 39	Disabled
6	2C0h + Node ID	500h	Input Data buffer, bytes 40... 47	
7	3C0h + Node ID	500h	Input Data buffer, bytes 48... 55	
8	4C0h + Node ID	500h	Input Data buffer, bytes 56... 63	
9...80	500h	500h	-	Disabled

Note: COB ID can not be changed while the module is in OPERATIONAL state, i.e. not while I/O data exchange is running. If COB ID is to be changed, the module should enter PRE-OPERATIONAL state.

Custom PDO Mapping

It is possible to customize the PDO implementation, see "Object Mapping (OBJECT_REMAP)" on page 35.

PDO Triggering Modes

Two triggering modes are supported:

- **Event Driven**

Message transmission is triggered by:

Transmission Type	Description	Notes
254/255	COS	When Process data have been changed (performance depends on the number of PDO's using COS)
1...240	Cyclic Synchronous	For synchronous this is the expiration of the specified transmission period, synchronized by the reception of the SYNC object. The data will be synced only to the Anybus module (current process data in buffer) and not all the way down to the application.
0	Acyclic Synchronous	Sent on SYNC and on the COS event.

- **Timer Driven**

Message transmission is either triggered by the occurrence of a device-specific event (COS) or if a specified has elapsed without the occurrence of the event.

Transmission Type	Description	Notes
254/255	COS/Timer	Message transmission is either triggered by the occurrence of a device-specific event (COS) or if a specified time has elapsed without occurrence of the event (Event Timer; specified separately for each TPDO in object entries 1800h-184Fh, sub-index 05h)

Note: Transmission type can not be changed while the module is in OPERATIONAL state, i.e. not while I/O data exchange is running. If transmission type is to be changed, the module should enter PRE-OPERATIONAL state.

2.4 Network Reset Handling

2.4.1 Reset Node

Upon receiving a 'Reset Node' request from the network, the module will perform one of two options:

- It will reset all parameters to their default values and resume network participation.
- If the reset indication bit is set by the application, the module will send a reset request message to the application. The application will handle the request and perform the reset of the module. The CANopen network will be shut down waiting for the application to execute the reset.

At the time of writing, the RST-bit in the Event Notification Cause¹ register will not be affected.

2.4.2 Reset Communication

Upon receiving a 'Reset Communication' request from the network, the module will reset the communication object to default start-up values.

The RST-bit in the Event Notification Cause¹ register will not be affected.

1. Consult the Anybus-S Parallel Design Guide for further information.

3. Object Dictionary Implementation

3.1 Standard Objects

3.1.1 General

The standard object dictionary is implemented according to the DS301 specification (v4.02) from CiA (CAN in Automation). Note that the contents of certain object entries may be customized using mailbox commands (see “Identity Customization” on page 21).

3.1.2 Object Entries

Index	Object Name	Sub-Index	Description	Type	Access	Notes
1000h	Device Type	00h	Device Type	U32	RO	0000 0000h (No profile)
1001h	Error register	00h	Error register	U8	RO	-
1003h	Pre-defined error field	00h	Number of errors	U8	RW	-
		01h...05h	Error field	U32	RO	-
1005h	COB-ID Sync	00h	COB-ID Sync	U32	RW	-
1008h	Manufacturer device name	00h	Manufacturer device name	Visible string	RO	See “Identity Customization” on page 21
1009h ^a	Manufacturer hardware version	00h	Manufacturer hardware version	Visible string	RO	
100Ah	Manufacturer software version	00h	Manufacturer software version	Visible string	RO	Reflects the software revision of the Anybus module.
100Ch	Guard time	00h	Guard time	U16	RW	-
100Dh	Life time factor	00h	Life time factor	U8	RW	-
1010h	Store Parameters ^b	00h	Largest sub index supported	U8	RO	01h
		01h	Store all parameters	U32	RW	-
1011h	Restore parameters ^c	00h	Largest sub index supported	U8	RO	01h
		01h	Restore all default parameters	U32	RW	-
1014h	COB ID EMCY	00h	COB ID EMCY	U32	RO	-
1016h	Consumer Heartbeat Time	00h	Number of entries	U8	RO	01h
		01h	Consumer Heartbeat Time	U32	RW	Node ID + Heartbeat Time. Value must be a multiple of 1ms.
1017h	Producer Heartbeat Time	00h	Producer Heartbeat Time	U16	RW	-
1018h	Identity object	00h	Number of entries	U8	RO	04h
		01h	Vendor ID	U32	RO	See “Identity Customization” on page 21
		02h	Product Code	U32	RO	
		03h	Revision Number	U32	RO	
		04h	Serial Number	U32	RO	

Index	Object Name	Sub-Index	Description	Type	Access	Notes
1400h ... 144Fh	Receive PDO parameter	00h	Largest sub-index supported	U8	RO	02h
		01h	COB ID used by PDO	U32	RW	-
		02h	Transmission type	U8	RW	-
1600h ... 164Fh	Receive PDO mapping	00h	No. of mapped application objects in PDO	U8	RW	-
		01h	Mapped object #1	U32	RW	-
		02h	Mapped object #2	U32	RW	-
		03h	Mapped object #3	U32	RW	-
		04h	Mapped object #4	U32	RW	-
		05h	Mapped object #5	U32	RW	-
		06h	Mapped object #6	U32	RW	-
		07h	Mapped object #7	U32	RW	-
		08h	Mapped object #8	U32	RW	-
1800h ... 184Fh	Transmit PDO parameter	00h	Largest sub-index supported	U8	RO	05h
		01h	COB ID used by PDO	U32	RW	-
		02h	Transmission type	U8	RW	-
		03h	Inhibit time	U16	RW	-
		05h	Event Timer (ms)	U16	RW	-
1A00h ... 1A4Fh	Transmit PDO mapping	00h	No. of mapped application objects in PDO	U8	RW	-
		01h	Mapped object #1	U32	RW	-
		02h	Mapped object #2	U32	RW	-
		03h	Mapped object #3	U32	RW	-
		04h	Mapped object #4	U32	RW	-
		05h	Mapped object #5	U32	RW	-
		06h	Mapped object #6	U32	RW	-
		07h	Mapped object #7	U32	RW	-
		08h	Mapped object #8	U32	RW	-

- a. This object is not enabled by default. For more information, see "Set Hardware Revision (SET_HARDWARE_REV)" on page 27.
- b. Relevant only for communication parameters and for baud rate, that also is stored.
- c. When the restore command is issued, baud rate is restored to the current switch setting.

3.2 Manufacturer Specific Objects

3.2.1 General

The Anybus Input- and Output Data buffers can be accessed as object entries in the manufacturer specific range (2001h...5FFFh). Separate object ranges are used for byte, word, and double-word access. Words and double-words use Motorola (high byte first) format.

3.2.2 Input Buffer, Byte Access

Index	Object Name	Sub-Index	Description	Type	Access	Notes
2000h	Input Buffer	00h	No. of entries	U8	RO	129
		01h	Input Buffer byte #0	U8	RO	-
		02h	Input Buffer byte #1			
				
		80h	Input buffer byte #127			
2001h	Input Buffer	00h	No. of entries	U8	RO	129
		01h	Input Buffer byte #128	U8	RO	-
		02h	Input Buffer byte #129			
				
		80h	Input buffer byte #255			
2002h	Input Buffer	00h	No. of entries	U8	RO	129
		01h	Input Buffer byte #256	U8	RO	-
		02h	Input Buffer byte #257			
				
		80h	Input buffer byte #383			
2003h	Input Buffer	00h	No. of entries	U8	RO	129
		01h	Input Buffer byte #384	U8	RO	-
		02h	Input Buffer byte #385			
				
		80h	Input buffer byte #511			
2004h	Input Buffer	00h	No. of entries	U8	RO	129
		01h	Input Buffer byte #512	U8	RO	-
		02h	Input Buffer byte #513			
				
		80h	Input buffer byte #639			
...
200Eh	Input Buffer	00h	No. of entries	U8	RO	129
		01h	Input Buffer byte #1792	U8	RO	-
		02h	Input Buffer byte #1793			
				
		80h	Input buffer byte #1919			
200Fh	Input Buffer	00h	No. of entries	U8	RO	129
		01h	Input Buffer byte #1920	U8	RO	-
		02h	Input Buffer byte #1921			
				
		80h	Input buffer byte #2047			

3.2.3 Input Buffer, Word Access

Index	Object Name	Sub-Index	Description	Type	Access	Notes
2020h	Input Buffer	00h	No. of entries	U8	RO	65
		01h	Input Buffer word #0	U16	RO	-
		02h	Input Buffer word #1			
				
		40h	Input buffer word #63			
2021h	Input Buffer	00h	No. of entries	U8	RO	65
		01h	Input Buffer word #64	U16	RO	-
		02h	Input Buffer word #65			
				
		40h	Input buffer word #127			
2022h	Input Buffer	00h	No. of entries	U8	RO	65
		01h	Input Buffer word #128	U16	RO	-
		02h	Input Buffer word #129			
				
		40h	Input buffer word #191			
2023h	Input Buffer	00h	No. of entries	U8	RO	65
		01h	Input Buffer word #192	U16	RO	-
		02h	Input Buffer word #193			
				
		40h	Input buffer word #255			
...
202Dh	Input Buffer	00h	No. of entries	U8	RO	65
		01h	Input Buffer word #832	U16	RO	-
		02h	Input Buffer word #833			
				
		40h	Input buffer word #895			
202Eh	Input Buffer	00h	No. of entries	U8	RO	65
		01h	Input Buffer word #896	U16	RO	-
		02h	Input Buffer word #897			
				
		40h	Input buffer word #959			
202Fh	Input Buffer	00h	No. of entries	U8	RO	65
		01h	Input Buffer word #960	U16	RO	-
		02h	Input Buffer word #961			
				
		40h	Input buffer word #1023			

3.2.4 Input Buffer, Double Word Access

Index	Object Name	Sub-Index	Description	Type	Access	Notes
2040h	Input Buffer	00h	No. of entries	U8	RO	33
		01h	Input Buffer dword #0	U32	RO	-
		02h	Input Buffer dword #1			
				
		20h	Input buffer dword #31			
2041h	Input Buffer	00h	No. of entries	U8	RO	33
		01h	Input Buffer dword #32	U32	RO	-
		02h	Input Buffer dword #33			
				
		20h	Input buffer dword #63			
2042h	Input Buffer	00h	No. of entries	U8	RO	33
		01h	Input Buffer dword #64	U32	RO	-
		02h	Input Buffer dword #65			
				
		20h	Input buffer dword #95			
2043h	Input Buffer	00h	No. of entries	U8	RO	33
		01h	Input Buffer dword #96	U32	RO	-
		02h	Input Buffer dword #97			
				
		20h	Input buffer dword #127			
...
204Dh	Input Buffer	00h	No. of entries	U8	RO	33
		01h	Input Buffer dword #160	U32	RO	-
		02h	Input Buffer dword #161			
				
		20h	Input buffer dword #191			
204Eh	Input Buffer	00h	No. of entries	U8	RO	33
		01h	Input Buffer dword #192	U32	RO	-
		02h	Input Buffer dword #193			
				
		20h	Input buffer dword #223			
204Fh	Input Buffer	00h	No. of entries	U8	RO	33
		01h	Input Buffer dword #224	U32	RO	-
		02h	Input Buffer dword #225			
				
		20h	Input buffer dword #255			

3.2.5 Output Buffer, Byte Access

Index	Object Name	Sub-Index	Description	Type	Access	Notes
2100h	Output Buffer	00h	No. of entries	U8	RO	129
		01h	Output Buffer byte #0	U8	R/W	-
		02h	Output Buffer byte #1			
				
		80h	Output buffer byte #127			
2101h	Output Buffer	00h	No. of entries	U8	RO	129
		01h	Output Buffer byte #128	U8	R/W	-
		02h	Output Buffer byte #129			
				
		80h	Output buffer byte #255			
2102h	Output Buffer	00h	No. of entries	U8	RO	129
		01h	Output Buffer byte #256	U8	R/W	-
		02h	Output Buffer byte #257			
				
		80h	Output buffer byte #383			
2103h	Output Buffer	00h	No. of entries	U8	RO	129
		01h	Output Buffer byte #384	U8	R/W	-
		02h	Output Buffer byte #385			
				
		80h	Output buffer byte #511			
2104h	Output Buffer	00h	No. of entries	U8	RO	129
		01h	Output Buffer byte #512	U8	R/W	-
		02h	Output Buffer byte #513			
				
		80h	Output buffer byte #630			
...
210Dh	Output Buffer	00h	No. of entries	U8	RO	129
		01h	Output Buffer byte #1664	U8	R/W	-
		02h	Output Buffer byte #1665			
				
		80h	Output buffer byte #1791			
210Eh	Output Buffer	00h	No. of entries	U8	RO	129
		01h	Output Buffer byte #1792	U8	R/W	-
		02h	Output Buffer byte #1793			
				
		80h	Output buffer byte #1919			
210Fh	Output Buffer	00h	No. of entries	U8	RO	129
		01h	Output Buffer byte #1920	U8	R/W	-
		02h	Output Buffer byte #1921			
				
		80h	Output buffer byte #2047			

3.2.6 Output Buffer, Word Access

Index	Object Name	Sub-Index	Description	Type	Access	Notes
2120h	Output Buffer	00h	No. of entries	U8	RO	65
		01h	Output Buffer word #0	U16	R/W	-
		02h	Output Buffer word #1			
				
		40h	Output buffer word #63			
2121h	Output Buffer	00h	No. of entries	U8	RO	65
		01h	Output Buffer word #64	U16	R/W	-
		02h	Output Buffer word #65			
				
		40h	Output buffer word #127			
2122h	Output Buffer	00h	No. of entries	U8	RO	65
		01h	Output Buffer word #128	U16	R/W	-
		02h	Output Buffer word #129			
				
		40h	Output buffer word #191			
2123h	Output Buffer	00h	No. of entries	U8	RO	65
		01h	Output Buffer word #192	U16	R/W	-
		02h	Output Buffer word #193			
				
		40h	Output buffer word #255			
...
212Dh	Output Buffer	00h	No. of entries	U8	RO	65
		01h	Output Buffer word #832	U16	R/W	-
		02h	Output Buffer word #833			
				
		40h	Output buffer word #895			
212Eh	Output Buffer	00h	No. of entries	U8	RO	65
		01h	Output Buffer word #896	U16	R/W	-
		02h	Output Buffer word #897			
				
		40h	Output buffer word #959			
212Fh	Output Buffer	00h	No. of entries	U8	RO	65
		01h	Output Buffer word #960	U16	R/W	-
		02h	Output Buffer word #961			
				
		40h	Output buffer word #1023			

3.2.7 Output Buffer, Double Word Access

Index	Object Name	Sub-Index	Description	Type	Access	Notes
2140h	Output Buffer	00h	No. of entries	U8	RO	33
		01h	Output Buffer dword #0	U32	R/W	-
		02h	Output Buffer dword #1			
				
		20h	Output buffer dword #31			
2141h	Output Buffer	00h	No. of entries	U8	RO	33
		01h	Output Buffer dword #32	U32	R/W	-
		02h	Output Buffer dword #33			
				
		20h	Output buffer dword #63			
2142h	Output Buffer	00h	No. of entries	U8	RO	33
		01h	Output Buffer dword #64	U32	R/W	-
		02h	Output Buffer dword #65			
				
		20h	Output buffer dword #95			
2143h	Output Buffer	00h	No. of entries	U8	RO	33
		01h	Output Buffer dword #96	U32	R/W	-
		02h	Output Buffer dword #97			
				
		20h	Output buffer dword #127			
...
214Dh	Output Buffer	00h	No. of entries	U8	RO	33
		01h	Output Buffer dword #160	U32	R/W	-
		02h	Output Buffer dword #161			
				
		20h	Output buffer dword #191			
214Eh	Output Buffer	00h	No. of entries	U8	RO	33
		01h	Output Buffer dword #192	U32	R/W	-
		02h	Output Buffer dword #193			
				
		20h	Output buffer dword #223			
214Fh	Output Buffer	00h	No. of entries	U8	RO	33
		01h	Output Buffer dword #224	U32	R/W	-
		02h	Output Buffer dword #225			
				
		20h	Output buffer dword #255			

3.2.8 Anybus Status & Diagnostics

Index	Object Name	Sub-Index	Type	Access	Notes
2200h	Bus State Indicator	00h	U8	RO	Reflects the actual state of the bus. 0: Bus initiating 1: Error Active (bus is running, the node flags any errors found) 2: Bus Off (node will be re-initiated, see object "Bus-off timeout" below) 3: Error Passive (Bus is still running, but with a large amount of errors, the node does not flag any errors)
2205h	Module State Indicator	00h	U8	RO	Reflects the state of the module on the network: 0: Init-State/Reset state 1: Init error 2: Prepared 3: Pre-operational 4: Operational
2210h	Module Serial Number	00h	U32	RO	These entries corresponds to the contents in the Control Register Area. (Consult the general Anybus-S Parallel Design Guide for further information).
2211h	Vendor ID	00h	U16	RO	
2212h	Module Status	00h	U16	RO	
2220h	Event Notification Count	00h	U16	RO	
2221h	Event Notification Cause	00h	U16	RO	
2222h	Event Notification Source	00h	U16	RO	
2230h	Watchdog Counter Input	00h	U16	RO	
2231h	Watchdog Counter Output	00h	U16	RO	
2240h	Input I/O Length	00h	U16	RO	
2241h	Input DPRAM Length	00h	U16	RO	
2242h	Total Input Length	00h	U16	RO	
2243h	Output I/O Length	00h	U16	RO	
2244h	Output DPRAM Length	00h	U16	RO	
2245h	Total Output Length	00h	U16	RO	
2260h	LED Status (1)	00h	U8	RO	
2261h	LED Status (2)	00h	U8	RO	
2262h	LED Status (3)	00h	U8	RO	
2263h	LED Status (4)	00h	U8	RO	
2800h	Bus-off timeout	00h	U16	R/W	Number of ms needed before the node re-initiates and enters pre-operational. (Default = 2000ms)

4. Mailbox Interface

This chapter describes the fieldbus specific mailbox commands in the module. Consult the Anybus-S Design Guide for more information regarding the mailbox functionality.

4.1 Overview

Command	Description	Page
Fieldbus Specific Initialisation (FB_INIT)	This command is used to initialise the module in fieldbus specific mode.	20
Set Product Code (SET_PRODUCT_CODE)	These commands are used to customize the appearance of the module on the network.	22
Set Product Info (SET_PRODUCT_INFO)		23
Set Product Info All (SET_PROD_INFO_ALL)		25
Set Hardware Revision (SET_HARDWARE_REV)		27
Set Offline Option (SET_OFFLINE_OPTION)	This command specified which event that should cause the module to consider the bus as off line.	28
Object Read (OBJECT_READ)	These commands are used to access the CAN-open object library as if it was an actual request from the bus.	29
Object Write (OBJECT_WRITE)		31
Emergency Message Indication (EMCY_MESSAGE)	This command is used to send an EMCY message on the bus.	33
Object Mapping (OBJECT_REMAP)	This command controls the PDO mapping.	35
Set Version 3 COBID and Bootup Function (SET_VER_3_COBID_BOOTUP)	Enables DS301 version 3 operation	37
Disable access to the objects 1010h and 1011h (DISABLE_STORE_RESTORE)	Disable access to the object 1010h - Store parameter and the object 1011h - Restore parameter	38
Set amount of PDO's (SET_PDO_AMOUNT)	Possible to define the amount of PDO's that should be available to use.	39
Get Notification Information (GET_NOTIFICATION_INFO)	Possible to get event notification from the module	40

4.2 Fault Codes

When a mailbox command cannot be processed, the Message Information register in the header of the response will indicate that an error occurred (consult the Anybus-S Design Guide for more information). If the error code is 'Invalid Other' (Fh), extended error information is available in the Fault Information register (Extended word 7 or 8, depending on the command).

This register holds a bit field where each bit indicates a particular error. This means that multiple faults may be indicated in a single message.

The structure of the Fault Information register is specified separately for each message.

4.3 Initialisation

4.3.1 Fieldbus Specific Initialisation (FB_INIT)

Description

This command initialises the module in fieldbus specific mode, and can be used either in conjunction with - or completely replace - the Anybus Init command (note that this also affects the command- and response layout, most notably the location of the Fault Information register).

Note: This command may only be issued during initialisation.

Command initiator	Application
Command number	0001h
Extended Header data	Fault information & Anybus Init Fault information
Message data	Communication settings.
Response message	-
Firmware Revision	All

Command and response layout (Anybus Init has been issued):

In this case, Anybus Init must be issued prior to this command.

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0001h	0001h	<i>FB_INIT</i>
Data size	0004h	0004h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	-	
		Fault Information	
Message data word 1	Node Address	Node Address	<i>"Node Address" on page 21</i>
Message data word 2	Baudrate	Baudrate	<i>"Baudrate" on page 21</i>

- Fault Information**

Bit	Fault
0	Illegal node address value
1	Illegal baudrate value

Command and response layout (Anybus Init has *not* been issued):

In this case, FB_INIT completely replaces the Anybus Init command.

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	FB_INIT
Command	0001h	0001h	
Data size	0016h	0016h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	"Fault Information" on page 20
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	Fault Information	
Extended word 8	-	Anybus Init Fault Information	Anybus Init parameters; Consult the Anybus-S Parallel Design Guide for further information
Message data word 1	Input I/O Length	Input I/O Length	
Message data word 2	Input DPRAM Length	Input DPRAM Length	
Message data word 3	Input Total Length	Input Total Length	
Message data word 4	Output I/O Length	Output I/O Length	
Message data word 5	Output DPRAM Length	Output DPRAM Length	
Message data word 6	Output Total Length	Output Total Length	
Message data word 7	Operation Mode	Operation Mode	
Message data word 8	Event Notification Config.	Event Notification Config.	
Message data word 9	Watchdog Timeout Value	Watchdog Timeout Value	
Message data word 10	Node Address	Node Address	
Message data word 11	Baudrate	Baudrate	

- Anybus Init Fault Information**

This value corresponds to the 'Fault Information' register returned by the module upon receiving the Anybus Init command. For more information, consult the general Anybus-S Parallel Design Guide.

- Node Address**

Node address value. Valid settings range from 1...127.

- Baudrate**

Value	Baudrate
1	10kbps
2	20kbps
3	50kbps
4	125kbps

Value	Baudrate
5	250kbps
6	500kbps
7	800kbps
8	1Mbps

4.4 Identity Customization

4.4.1 Set Product Code (SET_PRODUCT_CODE)

This command is used to customize the Product Code in the Identity Object (CANopen object entry 1018h). This enables configuration tools etc. to identify the module as a specific implementation rather than a generic Anybus-S module. Please note that the .EDS-file must be updated accordingly.

Note: This command may only be issued during initialisation.

Command initiator	Application
Command number	0002h
Extended Header data	Fault information
Message data	Product code
Response message	-
Firmware Revision	4.00 or higher

Command and response layout:

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0004h	0004h
Data size	0004h	0004h
Frame count	0001h	0001h
Frame number	0001h	0001h
Offset high	0000h	0000h
Offset low	0000h	0000h
Extended word 1	-	-
Extended word 2	-	-
Extended word 3	-	-
Extended word 4	-	-
Extended word 5	-	-
Extended word 6	-	-
Extended word 7	-	-
Extended word 8	-	-
		Fault Information
Message data byte 1	Product Code (high byte)	Product Code (high byte)
Message data byte 2	Product Code (mid high byte)	Product Code (mid high byte)
Message data byte 3	Product Code (mid low byte)	Product Code (mid low byte)
Message data byte 4	Product Code (low byte)	Product Code (low byte)

SET_PRODUCT_CODE

- **Fault Information**
(None)
- **Product Code**
4-byte Product Code.

4.4.2 Set Product Info (SET_PRODUCT_INFO)

This command customizes the following information:

- Vendor ID (Object entry 1018h, sub-index 01h)
- Product Code (Object entry 1018h, sub-index 02h)
- Manufacturer Device Name (Object entry 1008h)

This enables configuration tools etc. to identify the module as a specific implementation rather than a generic Anybus-S module. Please note that the .EDS-file must be updated accordingly.

Note: This command may only be issued during initialisation.

Command initiator	Application
Command number	0003h
Extended Header data	Fault information
Message data	Misc. customization info
Response message	-
Firmware Revision	4.00 or higher

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0003h	0003h	SET_PRODUCT_INFO
Data size	(size)	(size)	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault Information	
Message data byte 1	Vendor ID (high byte)	Vendor ID (high byte)	
Message data byte 2	Vendor ID (mid high byte)	Vendor ID (mid high byte)	
Message data byte 1	Vendor ID (mid low byte)	Vendor ID (mid low byte)	
Message data byte 2	Vendor ID (low byte)	Vendor ID (low byte)	
Message data byte 3	Product Code (high byte)	Product Code (high byte)	
Message data byte 4	Product Code (mid high byte)	Product Code (mid high byte)	
Message data byte 3	Product Code (mid low byte)	Product Code (mid low byte)	
Message data byte 4	Product Code (low byte)	Product Code (low byte)	
Message data byte 5	Device Name Length	Device Name Length	String length (32 ch. max)
Message data byte 6	Device Name (1st char)	Device Name (1st char)	Manufacturer Device Name
Message data byte 7	Device Name (2nd char)	Device Name (2nd char)	...
Message data byte 8	Device Name (3rd char)	Device Name (3rd char)	...
...
Message data byte n	Device Name (last char)	Device Name (last char)	...

- **Fault Information**

Bit	Fault
7	Manufacturer Device Name too long (32 characters max.)

- **Vendor ID**

4-byte Vendor ID.

- **Product Code**

4-byte Product Code.

- **Device Name Length**

Length of the Manufacturer Device Name in bytes.

- **Device Name**

Manufacturer Device Name as ASCII string.

4.4.3 Set Product Info All (SET_PROD_INFO_ALL)

This command is similar to SET_PRODUCT_INFO, except that it also specifies the Revision Number of the product. Please note that the .EDS-file must be updated accordingly.

Note: This command may only be issued during initialisation.

Command initiator	Application
Command number	0004h
Extended Header data	Fault information
Message data	Misc. customization info
Response message	-
Firmware Revision	4.00 or higher

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0004h	0004h	SET_PROD_INFO_ALL
Data size	(size)	(size)	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault Information	
Message data byte 1	Vendor ID (high byte)	Vendor ID (high byte)	
Message data byte 2	Vendor ID (mid high byte)	Vendor ID (mid high byte)	
Message data byte 3	Vendor ID (mid low byte)	Vendor ID (mid low byte)	
Message data byte 4	Vendor ID (low byte)	Vendor ID (low byte)	
Message data byte 5	Product Code (high byte)	Product Code (high byte)	
Message data byte 6	Product Code (mid high byte)	Product Code (mid high byte)	
Message data byte 7	Product Code (mid low byte)	Product Code (mid low byte)	
Message data byte 8	Product Code (low byte)	Product Code (low byte)	
Message data byte 9	Revision No.(high byte)	Revision No. (high byte)	
Message data byte 10	Revision No. (mid high byte)	Revision No. (mid high byte)	
Message data byte 11	Revision No. (mid low byte)	Revision No. (mid low byte)	
Message data byte 12	Revision No. (low byte)	Revision No. (low byte)	
Message data byte 13	Device Name Length	Device Name Length	String length (32 ch. max)
Message data byte 14	Device Name (1st char)	Device Name (1st char)	Manufacturer Device Name
Message data byte 15	Device Name (2nd char)	Device Name (2nd char)	...
Message data byte 16	Device Name (3rd char)	Device Name (3rd char)	...
...
Message data byte n	Device Name (last char)	Device Name (last char)	...

- **Fault Information**

Bit	Fault
7	Manufacturer Device Name too long (32 characters max.)

- **Vendor ID**

4-byte Vendor ID.

- **Product Code**

4-byte Product Code.

- **Revision No.**

4-byte Revision Number.

- **Device Name Length**

Length of the Manufacturer Device Name in bytes.

- **Device Name**

Manufacturer Device Name as ASCII string.

4.4.4 Set Hardware Revision (SET_HARDWARE_REV)

This command implements the Manufacturer Hardware Revision (1009h) entry in the CANopen object dictionary.

Note: This command may only be issued during initialisation.

Command initiator	Application
Command number	0006h
Extended Header data	Fault information
Message data	Manufacturer hardware revision value
Response message	-
Firmware Revision	4.00 or higher

Command and response layout:

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0006h	0006h
Data size	0004h	0004h
Frame count	0001h	0001h
Frame number	0001h	0001h
Offset high	0000h	0000h
Offset low	0000h	0000h
Extended word 1	-	-
Extended word 2	-	-
Extended word 3	-	-
Extended word 4	-	-
Extended word 5	-	-
Extended word 6	-	-
Extended word 7	-	-
Extended word 8	-	-
		Fault Information
Message data byte 1	Revision (high byte)	Revision (high byte)
Message data byte 2	Revision (mid high byte)	Revision (mid high byte)
Message data byte 3	Revision (mid low byte)	Revision (mid low byte)
Message data byte 4	Revision (low byte)	Revision (low byte)

SET_HARDWARE_REV

- **Fault Information**
(None)
- **Revision**
4-byte Manufacturer Hardware Revision.

4.5 Miscellaneous

4.5.1 Set Offline Option (SET_OFFLINE_OPTION)

This command specifies which event that will cause the module to report the bus as offline.

Note: This command may only be issued during initialisation.

Command initiator	Application
Command number	0007h
Extended Header data	Fault information
Message data	Offline option
Response message	-
Firmware Revision	4.00 or higher

Command and response layout:

	Command	Expected response	
	(ID)	(ID)	
Message ID	4002h	0002h	
Message information	0007h	0007h	SET_OFFLINE_OPTION
Command	0002h	0002h	
Data size	0001h	0001h	
Frame count	0001h	0001h	
Frame number	0000h	0000h	
Offset high	0000h	0000h	
Offset low	-	-	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	-	
Message data word 1	Offline Option	Fault Information	
		Offline Option	

- Fault Information**

Bit	Fault
10	Illegal offline option value

- Offline Option**

- 1: Bus error
- 2: Node Guarding or Heart Beat event

4.5.2 Object Read (OBJECT_READ)

This command returns the value of an entry in the CANopen object dictionary.

Command initiator	Application
Command number	0010h
Extended Header data	Object address details & fault information
Message data	-
Response message	Object data
Firmware Revision	4.10 or higher

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0010h	0010h	OBJECT_READ
Data size	0000h	(data size)	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	Index	Index	
Extended word 2	Sub-Index	Sub-Index	
Extended word 3	0000h	Length	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault Information	
		Object Data	Response data

- **Index**
Source object index.
- **Sub-Index**
Source object sub-index
- **Length**
Size of the returned data in bytes.
- **Fault Information**

Bit	Fault
0	Object index does not exist
1	Sub-index does not exist
2	Access fault; no read permission
3	Wrong byte count error
15	Other fieldbus specific error

- **Object Data**
Data read from the specified object.

4.5.3 Object Write (OBJECT_WRITE)

This command assigns a value to an entry in the CANopen object dictionary. Please note that the module treats this command as if it was an actual request on the bus; i.e. it is not possible to write to read-only objects etc.

Command initiator	Application
Command number	0020h
Extended Header data	Object address details & fault information
Message data	-
Response message	Object data
Firmware Revision	4.10 or higher

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0020h	0020h	OBJECT_WRITE
Data size	(data size)	(data size)	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	Index	Index	
Extended word 2	Sub-Index	Sub-Index	
Extended word 3	Length	Actual Length	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault Information	
Message data	Object Data	Object Data	

- **Index**
Destination object index.
- **Sub-Index**
Destination object sub-index.
- **Length**
Length of data to write.
- **Actual Length**
Amount of data that was actually written
- **Fault Information**

Bit	Fault
0	Object index does not exist
1	Sub-index does not exist
2	Access fault; no write permission
3	Wrong byte count error
4	Value out of range (too high)
5	Value out of range (too low)
6	Mapping error
7	Access fault; no read permission
15	Other fieldbus specific error

- **Object Data**
Data that shall be written to the specified object.

4.5.4 Emergency Message Indication (EMCY_MESSAGE)

This command issues an emergency telegram (EMCY) on the bus. The structure of the emergency telegram is specified in the DS301 specification from CiA (CAN in Automation).

Note: This command can not be issued during initialisation.

Command initiator	Application
Command number	0030h
Extended Header data	Fault information
Message data	EMCY error information
Response message	-
Firmware Revision	All

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0030h	0030h	EMCY_MESSAGE
Data size	0007h	0007h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault Information	
Message data byte 1	Emergency Error Code 1	Emergency Error Code 1	Emergency Error Code
Message data byte 2	Emergency Error Code 2	Emergency Error Code 2	Emergency Error Code
Message data byte 3	Emergency Error Code 3	Emergency Error Code 3	Manufacturer Specific Error
Message data byte 4	Emergency Error Code 4	Emergency Error Code 4	Manufacturer Specific Error
Message data byte 5	Emergency Error Code 5	Emergency Error Code 5	Manufacturer Specific Error
Message data byte 6	Emergency Error Code 6	Emergency Error Code 6	Manufacturer Specific Error
Message data byte 7	Emergency Error Code 7	Emergency Error Code 7	Manufacturer Specific Error

For more information regarding the structure of the EMCY telegram, consult the DS301 specification.

- Fault Information**

Bit	Fault
0	Emergency message not sent.

- Emergency error codes**

Code	Description
0000h	From a version 3 module

Code	Description
1080h	Initialization failed
6100h	Application stopped (watchdog timeout)
810h	Transmit buffer overflow, receive buffer overflow or overrun condition
8120	Error passive condition
8140	Recover from busoff.

4.5.5 Object Mapping (OBJECT_REMAP)

This command customizes the PDO mapping, i.e. it specifies which locations in the Input- and Output Data Areas to exchange as Process Data Objects.

Note: This command may only be issued during initialisation.

Command initiator	Application
Command number	0040h
Extended Header data	Fault information
Message data	PDO mapping information
Response message	-
Firmware Revision	4.10 or higher

Command and response layout:

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0040h	0040h
Data size	(size)	(size)
Frame count	0001h	0001h
Frame number	0001h	0001h
Offset high	0000h	0000h
Offset low	0000h	0000h
Extended word 1	PDO Type	PDO Type
Extended word 2	PDO Number	PDO Number
Extended word 3	-	-
Extended word 4	-	-
Extended word 5	-	-
Extended word 6	-	-
Extended word 7	-	-
Extended word 8	-	Fault Information
Message data word 1	DPRAM Offset, byte #1	DPRAM Offset, byte #1
Message data word 2	DPRAM Offset, byte #2	DPRAM Offset, byte #2
Message data word 3	DPRAM Offset, byte #3	DPRAM Offset, byte #3
Message data word 4	DPRAM Offset, byte #4	DPRAM Offset, byte #4
...
Message data word n	DPRAM Offset, byte #n	DPRAM Offset, byte #n

OBJECT_REMAP

- **PDO Type**

0100h: TPDO

0200h: RPDO

- **PDO Number**

This value specifies which PDO to map.

- **Fault Information**

Bit	Fault
0	Illegal PDO specified in the request.
1	Direction error; illegal PDO type specified in the request.
2	Data error. Mapping problem.

- **DPRAM Offset**

This value specifies the location of the data in dual port memory.

- For TPDOs, this must correspond to a location within the Input Data Area (DPRAM offset 000h... 1FFh).
- For RPDOs, this must correspond to a location within the Output Data Area (DPRAM offset 200h... 3FFh).

4.5.6 Set Version 3 COBID and Bootup Function (SET_VER_3_COBID_BOOTUP)

By default, the module operates according to DS301 version 4. This command makes it possible to downgrade the functionality of the COBID definition and Bootup functionality to DS301 version 3, enabling the module to be used on a DS301 version 3 network without a CANopen configurator.

Note: This command may only be issued during initialisation.

Command initiator	Application
Command number	0008h
Extended Header data	Fault information
Message data	-
Response message	-
Firmware Revision	4.32 or higher

Command and response layout:

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0008h	0008h
Data size	0000h	0000h
Frame count	0001h	0001h
Frame number	0001h	0001h
Offset high	0000h	0000h
Offset low	0000h	0000h
Extended word 1	-	-
Extended word 2	-	-
Extended word 3	-	-
Extended word 4	-	-
Extended word 5	-	-
Extended word 6	-	-
Extended word 7	-	-
Extended word 8	-	-

SET_VER_3_COBID

4.5.7 Disable access to the objects 1010h and 1011h (DISABLE_STORE_RESTORE)

By default, the object 1010h (store parameters) and the object 1011h (restore parameters) are accessible from the network for a user. This command makes it possible to disable these objects and not possible to be accessed from the network. It is still possible to use the mailbox command OBJECT_WRITE to access the objects.

Note: This command may only be issued during initialisation. If used an updated EDS file is required with the objects removed.

Command initiator	Application
Command number	000Ah
Extended Header data	Fault information
Message data	-
Response message	-
Firmware Revision	4.60 or higher

Command and response layout:

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	000Ah	000Ah
Data size	0000h	0000h
Frame count	0001h	0001h
Frame number	0001h	0001h
Offset high	0000h	0000h
Offset low	0000h	0000h
Extended word 1	-	-
Extended word 2	-	-
Extended word 3	-	-
Extended word 4	-	-
Extended word 5	-	-
Extended word 6	-	-
Extended word 7	-	-
Extended word 8	-	-

DISABLE_STORE_RESTORE

4.5.8 Set amount of PDO's (SET_PDO_AMOUNT)

This command makes it possible to define the amount of receive PDO's and transmit PDO's that should be available for a user, the value can be set from 1 to 80. If the command is not issued the default number of PDO's (80) will be available in each direction.

Note: This command may only be issued during initialisation. If used it will require a new updated EDS file specifying the amount of PDO's.

Command initiator	Application
Command number	0009h
Extended Header data	Fault information
Message data	Number of PDO's
Response message	Number of PDO's
Firmware Revision	4.36 or higher

Command and response layout:

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0009h	0009h
Data size	0004h	0004h
Frame count	0001h	0001h
Frame number	0001h	0001h
Offset high	0000h	0000h
Offset low	0000h	0000h
Extended word 1	-	-
Extended word 2	-	-
Extended word 3	-	-
Extended word 4	-	-
Extended word 5	-	-
Extended word 6	-	-
Extended word 7	-	-
Extended word 8	-	-
		Fault Information
Message data word 1	Number of receive PDO's	Number of receive PDO's
Message data word 2	Number of transmitt PDO's	Number of transmitt PDO's

SET_PDO_AMOUNT

- Fault Information**

If the command is rejected the maximum amount of PDO's possible to use is returned.

4.5.9 Get Notification Information (GET_NOTIFICATION_INFO)

The application may be notified that a command, “Reset node” and/or “restore_default” to object 1011h has been issued, but doesn’t know which one. This mailbox makes it possible to request information from the module on the current notification type.

Note: If both “Reset Node” and “Restore Default” flags are set, “restore_default” has priority and should be handled by the application first, before the module is reset.

Command initiator	Application
Command number	000Bh
Extended Header data	-
Message data	-
Response message	The notification information bit-field
Firmware Revision	4.62 or higher

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	000Bh	000Bh	GET_NOTIFICATION_INFO
Data size	0000h	0002h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	-	
Message data word 1	-	Notification bit-field	Notification information

Notification bit-field

b15 (MSB)	b14 -b2	b1	b0 (LSB)
ENABLED	Reserved (set to 0)	Restore Default	Reset Node

Bit(s)	Name	Description
15	ENABLED	Set when this functionality is enabled during initialization
14 - 2	(reserved)	(set to zero)
1	Restore Default	Set when CANopen command to restore default has been received by the module (“restore_default”(object 1011h, sub-index 1)) ^a
0	Reset Node	Set when CANopen command to reset the node has been received by the module. (NMT: RESET-NODE) ^a

a. The flags are valid until a correct GET_NOTIFICATION_INFO request is received and responded on by the Anybus-S module.

5. Fieldbus Specific Area

5.1 Memory Map

Address	Register
640h	Node Address
641h	Baudrate
643h	Bus State Indicator
644h	Module State Indicator
645h	Error Control Indicator
646h - 7BFh	(reserved, do not use)

- **Node Address**

This register contains the actual node address value (range: 1...127).

- **Baudrate**

This register contains the actual baudrate value as follows:

Value	Baudrate	Value	Baudrate
1	10kbps	5	250kbps
2	20kbps	6	500kbps
3	50kbps	7	800kbps
4	125kbps	8	1Mbps

- **Bus State Indicator**

See object entry 2200h (“Anybus Status & Diagnostics” on page 18).

- **Module State Indicator**

See object entry 2205h (“Anybus Status & Diagnostics” on page 18).

- **Error Control Indicator**

This byte reflects if Node Guarding/Heartbeat is Disabled or Enabled

Bit	Meaning
0	Node Guarding Enabled
1	Heartbeat Consumer Enabled
2	Heartbeat Producer Enabled

Note: Bit 0 is not set until first Node guarding is received from the Master.

Bit 1 is not set until first Heartbeat is received from the Slave/Master.

A. Miscellaneous

A.1 Control Register Area

Fieldbus Type

The fieldbus type value for this product is 0020h.

Module Type

The module type value for this product is 0101h (Anybus-S).

Watchdog Counter Input (7D2h... 7D3h)

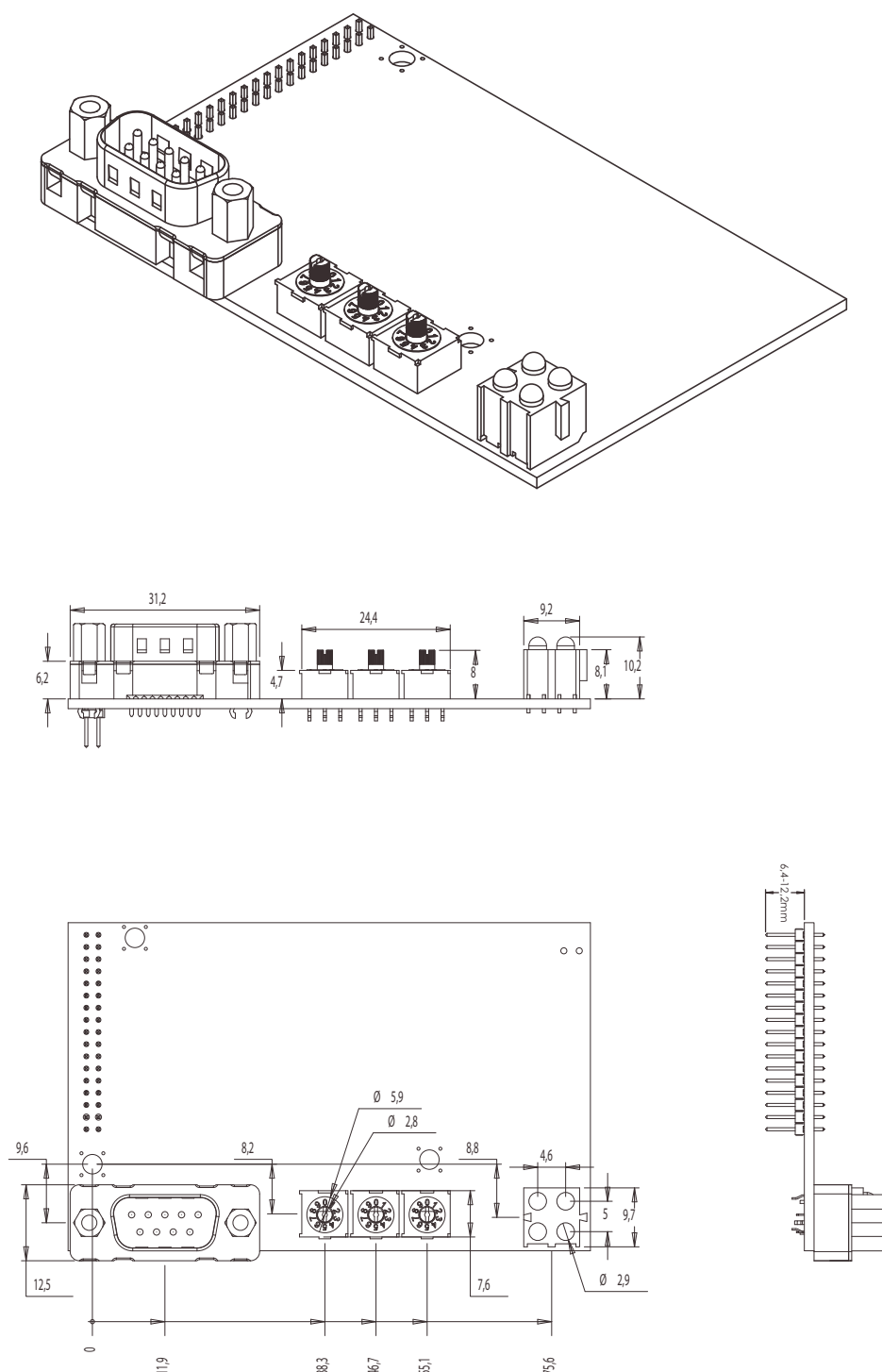
If the application has enabled the Watchdog Counter Input and doesn't update it properly, the module will issue an emergency message (Emergency Error Code 6100h, 'Internal software error') on the bus and cease all network participation. An internal error will be indicated on the Status LED.

Event Notification Cause/Source Registers

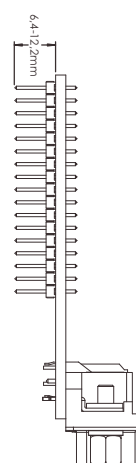
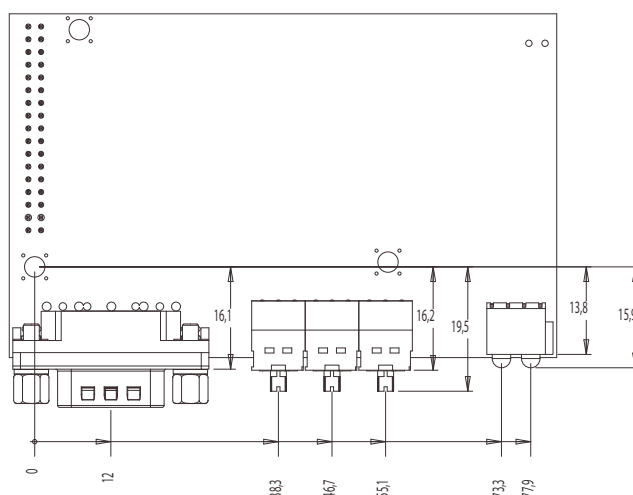
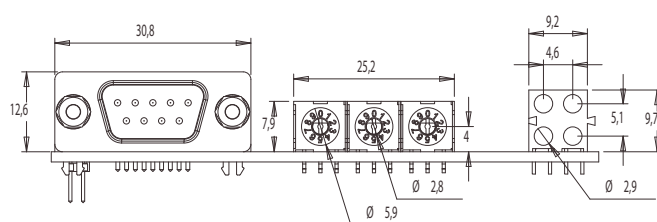
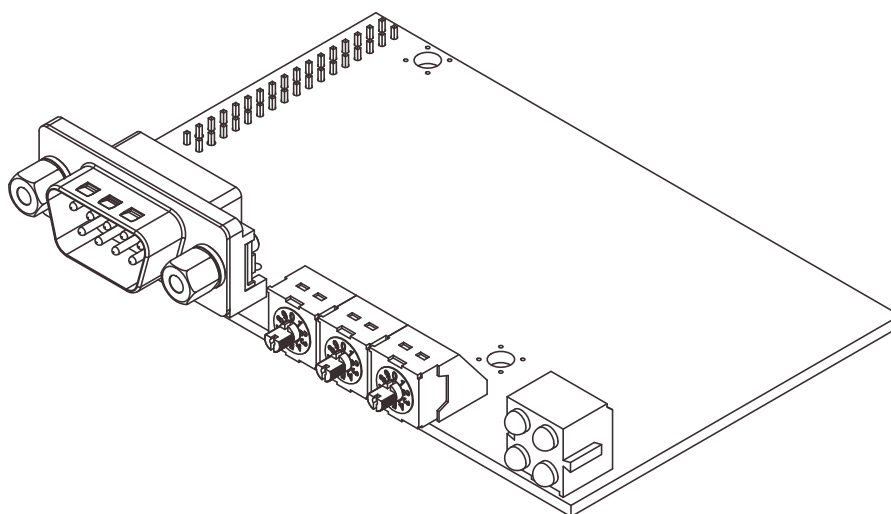
- **ON/OFF Line Indication (FBON/FBOF)**
See "Set Offline Option (SET_OFFLINE_OPTION)" on page 28.
- **Network Reset Functionality (RST)**
(not implemented)

B. Mechanical Specification

B.0.1 Straight Switches & Connectors



B.0.2 Angled Switches & Connectors



C. Technical Specification

C.1 Electrical Specification

C.1.1 Protective Earth (PE) Requirements

All Anybus-S/M modules features a cable shield filter designed according to each network standard. To be able to support this, the application *must* provide a connection to PE (Protective Earth) as described in the general Anybus-S Parallel Design Guide. HMS cannot guarantee proper EMC behaviour unless this requirement is fulfilled.

C.1.2 Power Supply

Supply Voltage

The module requires a regulated 5V power supply as specified in the Anybus-S Parallel Design Guide.

Power Consumption

The maximum power consumption is 140mA.

C.2 Environmental Specification

- **Temperature**

Test performed according to IEC-68-2-1 and IEC 68-2-2.

Operating: 0 to 70°C (32 to 158°F)

Storage: -25 to +85°C (-13 to 185°F)

- **Humidity**

The product is designed for a relative humidity of 5 to 95% non-condensing.

Test performed according to IEC 68-2-30.

C.3 EMC Compliance (CE)

The EMC pre-testing has been conducted according to the following standards:

- **Emission:** EN 50 081-2:1993

Tested per EN 55022 Class A: 1997

- **Immunity:** EN 61000-6-2: 1999

Tested per EN 61000-4-2:1995

EN 61000-4-3:1996

EN 61000-4-4:1995

EN 61000-4-5:1995

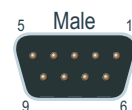
EN 61000-4-6:1996

D. Connectors

D.1 Fieldbus Interface

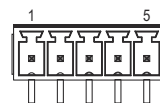
9-pin D-sub (Standard connector)

Pin	Signal
Housing	CAN_SHLD
1	-
2	CAN_L
3	CAN_GND
4	-
5	CAN_SHLD
6	CAN_GND
7	CAN_H
8	-
9	(reserved)



Screw Terminal

Pin	Signal
1	CAN_GND
2	CAN_L
3	CAN_SHLD
4	CAN_H
5	(reserved)



2mm Board to Board

Pin	Signal
1	CAN_SHLD
2	-
3	CAN_L
4	CAN_GND
5	CAN_H
6	CAN_GND
7	-
8	(reserved)
9	-
10	CAN_SHLD

