Fieldbus Appendix
Anybus-M DeviceNet

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Rev. 2.21

Important User Information

This document is intended to provide a good understanding of the functionality offered by Anybus-M DeviceNet. The document only describes the features that are specific to the Anybus-M DeviceNet. For general information regarding the Anybus-M, consult the Anybus-S/M Parallel Design Guide.

Please consult the general Anybus-S Parallel Design Guide for further information about the Anybus-S platform.

The reader of this document is expected to be familiar with high level software design, and communication systems in general. The use of advanced DeviceNet-specific functionality may require in-depth knowledge in Device-Net networking internals and/or information from the official DeviceNet specifications. In such cases, the people responsible for the implementation of this product should either obtain the DeviceNet specification to gain sufficient knowledge or limit their implementation in such a way that this is not necessary.

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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.

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For more information, documentation etc., please visit the HMS website, 'www.anybus.com'.

P.1 Related Documents

Document	Author
Anybus-S Parallel Design Guide	HMS
DeviceNet Specification	ODVA

P.2 Document History

Summary of Recent Changes (2.20 ... 2.21)

Change	Page(s)
Clarified information on AutoScan	14
Command Set DIP-Switch returned to manual	41
Command Send Explicit Message returned to manual	49
Command Set Scanner Operation Mode returned to manual	51
Command Explicit Message Result returned to manual	58

Revision List

Revision	Date	Author(s)	Chapter(s)	Description
2.00	2008-05-11	PeP	All	Initial revision
2.10	2009-06-16	StK	All	Minor updates and corrections
2.20	2011-06-10	KeL	P, 4, 5, 6, D	Minor updates and corrections, new template
2.21	2012-03-28	KeL	2, 5	Old mailboxes returned to manual, minor update

P.3 Conventions & Terminology

The following conventions are used throughout this manual:

- Numbered lists provide sequential steps
- Bulleted lists provide information, not procedural steps
- The terms 'Anybus' or 'module' refers to the Anybus-CompactCom module.
- The terms 'host' or 'host application' refers to the device that hosts the Anybus module.
- Hexadecimal values are written in the format NNNNh, where NNNN is the hexadecimal value.

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1. About the Anybus-M DeviceNet

1.1 General

The Anybus-S DeviceNet communication module provides DeviceNet scanner functionality via the patented Anybus-M application interface. The hardware is optimized for high throughput and can be used in single- or multi-scanner networks at speeds up to 500kbps.

The scanner can be configured either externally using a PC-based configuration tool such as Anybus NetTool for DeviceNet, or internally through the application interface.

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

1.2 Features

- Galvanically isolated bus electronics
- Controls up to 63 DeviceNet nodes
- Up to 1536 bytes of I/O in each direction
- 2kbyte or 4kbyte DPRAM modes
- Explicit Message Server (up to 5 explicit message connections, group 1 or 3)
- Unconnected Message Manager (group 3, Message ID 6)
- Supports Quick Connect (client- and server mode)
- Shared Inputs
- Auto Device Replacement (ADR)
- AutoScan
- 125kbps, 250kbps and 500kbps operation
- Automatic baudrate detection
- On-board configuration switches
- Configuration via DeviceNet, serial channel, mailbox interface or USB

1.3 Conformance Note

The Anybus-M DeviceNet has been pre-compliance tested stand alone by ODVA's authorized Independent Test Lab, and found to comply with ODVA Conformance Test Software Version A19. However, according to ODVA's conformance test policy, the final product must still be re-certified as a complete product.

For further information, contact HMS or ODVA.

1.4 Overview
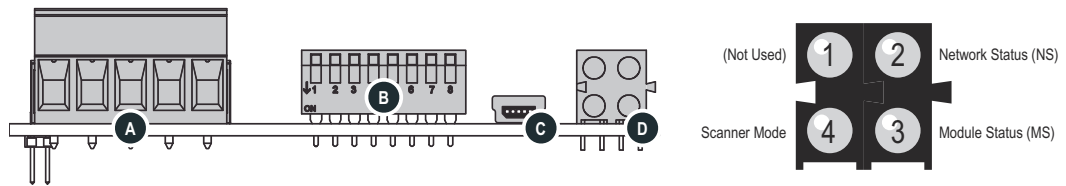
#	Description	Description
A	DeviceNet Connector	See Appendix "Connectors" on page 86
B	Configuration Switches	See "Configuration Switches" on page 7
C	USB Connector	See Appendix "Connectors" on page 86
D	Status LEDs	See "Status LEDs" on page 5

1.5 Status LEDs

These leds indicate run time status and errors to the user.

LED	State	Meaning
Network Status (NS)	Off	Not powered, not on line
	Green	On line, one or more connections established
	Green, flashing	On line, no connections established
	Red	Critical link failure
	Red, flashing	One or more connections timed out
	Alternating Red/Green	Device self-test in progress
Module Status (MS)	Off	No power
	Green	Normal operation
	Green, flashing	Auto baud in progress
	Red	Major fault
	Red, flashing	Minor fault
	Alternating Red/Green	Device self-test in progress
Scanner Mode	Off	No power
	Green	Run mode
	Green, flashing	Idle mode

2. Basic Operation

2.1 General Information

To fully take advantage of advanced scanner/network functionality, a certain degree of dedicated software support may be necessary. Also, due the nature of the DeviceNet networking system, certain restrictions must be taken into account.

- The I/O sizes specified in ANYBUS_INIT must match certain predefined settings.
- No mailbox commands may be issued for at least 2 seconds after receiving the response to the END_INIT-message.
- If the product is to be mounted vertically or up side down, the value of the on-board switches must be re-interpreted accordingly to comply with DeviceNet specifications.

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

2.2 Configuration Switches

On a DeviceNet network, each node is identified by it's own unique Mac ID. The Mac ID and Baud rate settings can be set either using the on-board configuration switches or through the application interface by means of mailbox commands.

Switches 1 and 2 specify the baudrate, while switches 3 though 8 specify the Mac ID:

S1	S2	Baudrate
OFF	OFF	125k
OFF	ON	250K
ON	OFF	500K
ON	ON	(reserved)

S3	S4	S5	S6	S7	S8	Mac ID
OFF	OFF	OFF	OFF	OFF	OFF	0
OFF	OFF	OFF	OFF	OFF	ON	1
OFF	OFF	OFF	OFF	ON	OFF	2
OFF	OFF	OFF	OFF	ON	ON	3
...	...	...	...	...	...	...
ON	ON	ON	ON	OFF	OFF	60
ON	ON	ON	ON	OFF	ON	61
ON	ON	ON	ON	ON	OFF	62
ON	ON	ON	ON	ON	ON	63

Depending on the physical orientation of the scanner, it may be necessary to change the bit definition of the switches to comply with the DeviceNet specification. This is achieved by reading the physical switch value (see "Get DIP-Switch" on page 53), alter it as required, and writing it back (see "Set MAC ID and Baud Rate" on page 61).

Optionally, the MAC ID and Baud Rate can be specified from the network. This functionality is disabled by default, but can be enabled using the 'Set Mac ID and Baud Rate'-command.

See also...

IMPORTANT: *The recommendations regarding the switches has changed somewhat compared to older revisions of the product. Note however that the scanner is fully backwards compatible regarding this functionality, and still supports the 'Set DIP-Switch'-command.*

2.3 Initialization Sequence

The initialization sequence determines how the scanner will operate on the network, and certain basic operational parameters such as memory layout etc.

The initialization sequence looks as follows:

■ **Power On (Reset)**

1. Send 'START_INIT'[1]

This step starts the initialization sequence.

2. Fieldbus Specific Commands (Optional)

This step initializes some of the more advanced functions in the master. If only basic master functionality is needed, this step can be omitted.

3. Send 'ANYBUS_INIT'[1]

The following data sizes are accepted:

Setting	DPRAM Mode	
	Standard	**Extended**
Input I/O length	512	1536
Input DPRAM length	512	1536
Input Total length	512	1536
Output I/O length	512	1536
Output DPRAM length	512	1536
Output Total length	512	1536

4. Send 'END_INIT'[1]

This step ends the initialization sequence.

■ **Ready**
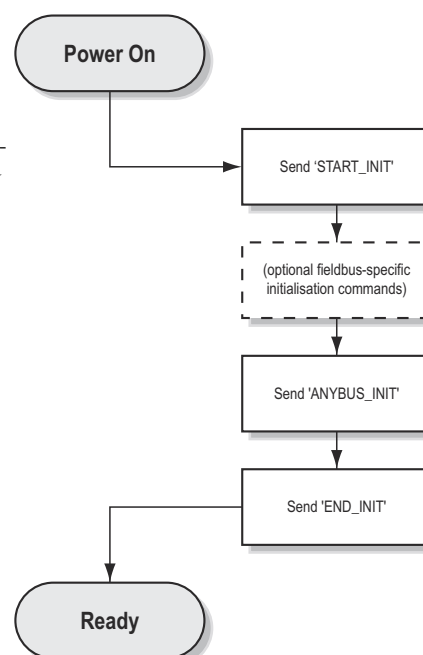
See also...

- "Memory Maps" on page 11
- "Mailbox Interface" on page 39
- "Fieldbus Specific Initialization" on page 60 (specifies DPRAM mode)
- General Anybus-S/M Parallel Design Guide

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1. For more information about this command, consult the general Anybus-S/M Parallel Design Guide.

2.4 Data Exchange

2.4.1 'Input' and 'Output' Definitions

When using the Anybus-M DeviceNet scanner together with the bus configuration software Anybus NetTool for DeviceNet (NetTool-DN) it should be noted that different definitions for 'Input Data' and 'Output Data' are used:

- The conventions used in this document follows that of other Anybus-S/Anybus-M products; the term 'Input Data' refers to data sent to the network while the term 'Output Data' refers to data received from the network - regardless of if the module is a master (scanner) or a slave.
- NetTool-DN uses the same definition as an end user normally will see from a configuration tool; the term 'Input Data' refers to data read from a slave device, while the term 'Output Data' refers to data written to a slave device.

At first the contradiction in these two definitions may appear as a potential problem, but since the end users does not need to be aware of the definitions used between the Anybus-M DeviceNet scanner and the application system, only the definition in the NetTool-DN will apply to them.

See also...

- "Memory Maps" on page 11

2.4.2 Input- and Output Area Contents

The Input- and Output Areas holds the I/O associated with the configured nodes on the network. The contents and structure of these areas depends on the actual scanlist configuration.

See also...

- "Memory Maps" on page 11

2.4.3 Scanner Operation Modes

During normal operation, the scanner implements two modes of operation, affecting how data is exchanged on the network (i.e. the communication between the application and the scanner remains unaffected).

- **Run Mode**

   In Run Mode, the scanner exchanges data with all configured nodes that have one or more established I/O connections. Any data written to the Input Area will be forwarded to the corresponding nodes on the network. By default, it is not possible to alter the scanlist in this mode.

- **Idle Mode**

   In Idle Mode, nodes can be added and removed from the scanlist, and their I/O can be mapped to the Input- and Output Areas. For consistency reasons, data in the Input Area will not be forwarded to the network in this mode.

See also...

2.4.4 Data Consistency

The Anybus-S access protocol ensures consistency for all data residing in Dual Port Memory, since access is only permitted while explicitly granted by the scanner. Consistency for data residing in extended memory is for natural reasons only guaranteed for each separate access.

Consistency between the Control Registers, Fieldbus Specific Area and the Input- and Output Areas cannot be guaranteed since this information is handled separately in the Anybus-S access protocol.

See also...

2.5 Memory Maps

The DPRAM in the Anybus-M DeviceNet has been extended to allow fast access to larger amounts of network data. This is accomplished by using pin 34 of the application connector as address line 11 (A11), giving an effective address range of 4kbyte instead of the standard 2kbyte. The advantage of this is that while the total I/O size remains limited to 2kbyte, a larger portion of this I/O data can be accessed directly in the dual port memory instead of via the mailbox interface.

Note that this feature is optional; e.g. if A11/pin 34 is not implemented, the memory layout is consistent with the standard Anybus-S memory map.

Standard Mode (2kbyte DPRAM)

Location:	Area:	Access:	Notes:
800h... 9FFh	Input Area (512 bytes)	R/W	The structure of these areas is determined by the contents of the database.
A00h... BFFh	Output Area (512 bytes)	RO	
C00h... D1Fh	Mailbox In	R/W	
D20h... E3Fh	Mailbox Out	RO	
E40h... FBFh	Fieldbus Specific Area	RO	See "Fieldbus Specific Area" on page 73
FC0h... FFDh	Control Registers	R/W	See "Control Register Area" on page 78
FFEh... FFFh	Handshake Registers	R/W	

Extended Mode (4kbyte DPRAM)

Location:	Area:	Access:	Notes:
000h... 5FFh	Input Area (1536 bytes)	R/W	The structure of these areas is determined by the contents of the database.
600h... BFFh	Output Area (1536 bytes)	RO	
C00h... D1Fh	Mailbox In	R/W	
D20h... E3Fh	Mailbox Out	RO	
E40h... FBFh	Fieldbus Specific Area	RO	See "Fieldbus Specific Area" on page 73
FC0h... FFDh	Control Registers	R/W	See "Control Register Area" on page 78
FFEh... FFFh	Handshake Registers	R/W	

See also...

3. DeviceNet Scanner Implementation

3.1 General Information

DeviceNet is based on the Common Industrial Protocol (CIP) which is also the application layer for CompoNet, ControlNet and EtherNet/IP.

CIP Identity

By default, the scanner supports the generic CIP-profile with the following identity settings:

- Vendor ID: 005Ah (HMS Industrial Networks)
- Device Type: 000Ch (Communications Adapter)
- Product Code: 0026h (Anybus-M DeviceNet)
- Product Name: 'Anybus-M DeviceNet'

See also...

- "Identity Object, Class 01h" on page 22
- "Set Product Info" on page 42
- "Set Product Code" on page 43

IMPORTANT: *The default identity information is valid only when using the standard EDS-file supplied by HMS. To comply with CIP-specification requirements, custom EDS-implementations require a new Vendor ID.*

For further information, contact HMS and/or ODVA.

Electronic Data Sheet (EDS)

Each device in a DeviceNet network is associated with an EDS file, which describes the implementation of the product. This file is used by the configuration tool when setting up the network communication. HMS supplies a generic EDS-file, specifying the features supported by the scanner.

The latest version of EDS file can either be downloaded from HMS website (www.anybus.com) or obtained by contacting HMS.

See also...

- "CIP Identity" on page 12
- "Identity Object, Class 01h" on page 22

IMPORTANT: *The generic EDS-file supplied by HMS can be used with the standard CIP Identity settings. To comply with CIP-specification requirements, any changes made to this file also requires a new Vendor ID.*

For further information, contact HMS and/or ODVA.

3.2 DeviceNet Features

3.2.1 Shared Inputs

The scanner supports shared inputs, which allows the data produced by a slave node to be shared between multiple scanners.

One of the scanners acts as the "real" scanner on the network, and will allocate the slave node accordingly. The node can then be added as a shared input node in the scan lists of the other scanners as well, which will consume the data produced by the slave node without having to establish a separate connection.

3.2.2 Slave Mode

The scanner can operate in slave mode, in which case it will act as a server for I/O connection originating from other scanners.

3.2.3 Auto Device Replacement (ADR)

The scanner supports both Configuration Recovery and Auto Address Recovery found in the Auto Device Replacement (ADR) extension.

The data in the Device Keeper Object, used during Configuration Recovery, is stored in non-volatile memory. The maximum size of the data that this object can hold is 64k, including the CCV, destination node address, trigger, and the whole message block.

See also...

3.2.4 AutoScan

The scanner supports AutoScan, a feature which allows the scanner to automatically scan the network for nodes and add them to the scanlist. Note that only nodes in which the data size does not exceed the Fixed Mapping Size can be added to the scanlist this way. Also note that enabling AutoScan will clear the scanlist, erasing any previous configuration.

When added to the scanlist, nodes are mapped to the Input- and Output Areas based on their MAC ID and the Fixed Mapping Size.

Formula:

```
I/O Area start location = MAC ID * Fixed Mapping Size
```

The Fixed Mapping Size is given in bytes and the default value is 4. If needed, it is possible to specify a different Fixed Mapping Size, allowing nodes with greater amount of data to be added using AutoScan. Note however that in either case, the total I/O size cannot exceed 512 bytes in each direction; any node that by the above formula end up outside this range will not be scanned for. The maximum possible Fixed Mapping Size is 32 bytes, in which case scanner only scans for nodes with MAC IDs 0... 15.

Example:

Example where the Fixed Mapping Size is set to 16, MAC IDs 5, 10, 40 present on the network.

```
32              = 5 * 16
160             = 10 * 16
640             = 40 * 16 (!)
```

As seen in the example, the node with MAC ID 40 ends up outside of the 512 byte boundary and thus will not be scanned for.

The AutoScan process works by issuing connect messages at predefined intervals. Undetected nodes (i.e. nodes not physically present on the network) are scanned for once each second. Detected but for some reason unsuitable nodes (i.e. nodes which does not support the predefined connection set - or - has an I/O size that exceeds the Fixed Mapping Size) are scanned for every ten seconds.

When a suitable node (i.e. a node that supports the predefined connection set - and - has a data size less or equal to the Fixed Mapping Size) is found, the scanner attempts to allocate an I/O connection towards it in the following order: COS, Poll, Strobe, Cyclic. If Quick Connect has been enabled for the node in question, the scanner enables this feature in the scanlist. ADR will also be enabled when Auto-Scan is activated.

See also...

- "Auto Device Replacement (ADR)" on page 13
- "Quick Connect" on page 15
- "Scanner Configuration Object, Class 90h" on page 36

3.2.5 Quick Connect

The scanner supports Quick Connect, both as a client and server. This feature enables nodes to be added very quickly to the network without completing the duplicate address check sequence.

In Client Mode, Quick Connect works by changing the communication establishment process for the nodes which have this feature enabled, allowing them to quickly connect to the network without completing the duplicate address check sequence first.

See also...

- "AutoScan" on page 14

3.2.6 Unconnected Message Manager (UCMM)

The scanner is a UCMM-capable device, supporting the Unconnected Explicit Message Request port, Group 3, Message ID 6.

3.2.7 Explicit Message Server

The scanner supports up to 5 explicit message connections. The connections can be opened in either group 1 or group 3.

3.3 Scanlist Configuration

The scanner supports configuration of the scanlist via several different interfaces:

- **Configuration via DeviceNet**

  This is the de-facto standard way of configuring scanners on DeviceNet, and is compatible with a wide range of different configuration tools, such as Anybus NetTool for DeviceNet and RsNetWorx. The configuration process is managed through a dedicated Vendor Specific Object.

  Note: The scanner also supports AutoScan, which allows the scanner to build a scanlist configuration automatically based on certain predefined conditions.

- **Configuration via Application Interface**

  This option allows the scanlist configuration to be specified through the application interface by means of mailbox communication. This allows the configuration to be specified from the application where the scanner is implemented, e.g. and HMI or a robot controller with a user interface.

  See also...

  - "Get Scanlist Instance" on page 44
  - "Set Scanlist Instance" on page 45
  - "Reset Scanner Configuration" on page 48

- **Configuration via Serial Interface**

  This option allows the scanlist to be specified through the serial channel of the Anybus application interface, and is compatible with the HMS standard configuration tool Anybus NetTool for DeviceNet.

- **Configuration via USB**

  This option allows the scanlist to be specified through the on-board USB connector, and is compatible with the HMS standard configuration tool Anybus NetTool for DeviceNet.

IMPORTANT: *For reasons of backwards compatibility, the scanner does not implement any mechanisms of protecting the consistency of the configuration in case multiple sources attempts to configure the scanner at the same time. For example, if attempting to configure the scanner from DeviceNet, and at the same time downloading a configuration through the application interface, it is possible to end up with an configuration which does not match that of either one of the sources.*

The implementation must therefore, if necessary, implement procedures or mechanisms of protecting the consistency of the scanlist configuration.

3.4 Scan Cycle

3.4.1 General Information

This section attempts to explain the concepts and parameters involved in the I/O scan process.

The following figure depicts a typical Scan Cycle on DeviceNet:
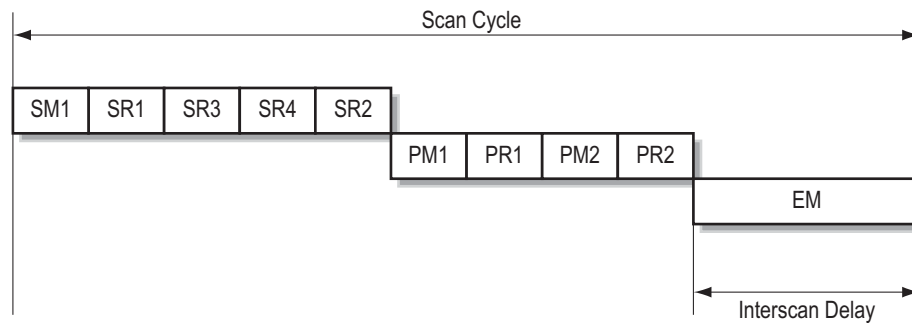
SM: Strobed Message
SR: Strobed Response
PM: Polled Message
PR: Polled Response
EM: Explicit Messages

3.4.2 Interscan Delay (ISD)

The Interscan Delay is the time between two consecutive I/O scans, and takes place after the last I/O message in the Scan Cycle (PR2 in the figure). This time period is used to perform non-time-critical communication such managing the communication with configuration software or exchanging explicit messages.

Setting this parameter to a very low value increases the latency for non-time-critical operations, including the time required to respond to configuration changes. Setting it to a very large value is not recommended, since that effectively reduce the rate at which the I/O is exchanged.

See also...

3.4.3 Expected Packet Rate (EPR)

The Expected Packet Rate defines the rate at which packets are expected to be received by the scanner. If the scanner does not receive a packet from the device within this time period, it will drop the connection and attempt to re-establish it during subsequent scan cycles.

There is a direct correlation between the Interscan Delay and the corresponding Expected Packet Rate. Exceeding the parameters of this relationship may cause any polled and/or strobed connection to time-out.

Correlation	Result
ISD >= (EPR * 4)	Timeout
(EPR * 3) < ISD < (EPR * 4)	Appear suspect
ISD <= (EPR * 3)	Moderately successful
ISD <= EPR	Completely successful

See also...

- "Interscan Delay (ISD)" on page 17
- "Foreground to Background Poll Ratio (FBP)" on page 18
- "Heartbeat Rate" on page 19
- "Send Rate" on page 19

3.4.4 Foreground to Background Poll Ratio (FBP)

This parameter represents the ratio between foreground and background polls, and specifies the frequency of polled I/O messages to a device in relation to the number of I/O scans. A value of 5 means that the scanner will poll the specified node once every six I/O scans. Valid settings range from 1 to 32000.

There is a direct correlation between this parameter, the Interscan Delay, and the Expected Packet Rate. Exceeding the parameters of this relationship may cause any background-polled connections to timeout.

Correlation	Result
(FBP * ISD) >= (EPR * 4)	Timeout
(EPR * 3) < (FBP * ISD) < (EPR * 4)	Appear suspect
(FBP * ISD) <= (EPR * 3)	Moderately successful
(FBP * ISD) <= EPR	Completely successful

See also...

- "Interscan Delay (ISD)" on page 17
- "Expected Packet Rate (EPR)" on page 18

3.4.5 Heartbeat Rate

The Heartbeat Rate represents the background production interval for the Change of State (COS) connection. The scanner will send its data after this time even if it hasn't change since the last time it was produce. This enables the consuming node to distinguish the difference between a node whose data hasn't changed and one that has become non-operational. Valid settings range from 3 times the value of the Ack Timeout to 32000ms.

For COS messages, the Heartbeat Rate equals the Expected Packet Rate used by strobed and polled messages. To ensure that no timeout occurs, set the Heartbeat Rate to less than the Expected Packet Rate.

See also...

- • "Expected Packet Rate (EPR)" on page 18
- • "Timeout Cross Reference" on page 20

3.4.6 Send Rate

The Send Rate represents the background production interval for the cyclic connection. The node will send its data after this time even if it hasn't change since the last time it was produce. This enables the consuming node to distinguish the difference between a node whose data hasn't changed and one that has become non-operational. Valid settings range from 3 times the value of the Ack Timeout to 32000ms.

For cyclic messages, the Send Rate equals the Expected Packet Rate used by the strobed and polled messages. To ensure that no timeout occurs, set the Send Rate to less than the Expected Packet Rate.

See also...

- • "Expected Packet Rate (EPR)" on page 18
  "Timeout Cross Reference" on page 20

3.4.7 Timeout Cross Reference

The following table specifies the Timeout conditions associated with each message type.

Type	Description	Device will timeout when...	Scanner will timeout when...
Strobed	The scanner issues a single strobed request message. Each device on the network then responds with it's corresponding data.	A strobed request message has not been received within the Expected Packet Rate * 4.	A strobed response message has not been received from the device within the Expected Packet Rate * 4.
Polled	The scanner issues a polled request message for each device that is being polled. Each device on the network then responds with it's corresponding data. Background-polled messages are only issued during the Fore-ground to Background Poll Ratio scan cycle.	A polled request message has not been received within the Expected Packet Rate * 4.	A polled response message has not been received from the device within the Expected Packet Rate * 4.
COS	Both the scanner and the device will issue the COS message whenever data has changed or when the Heartbeat timer has expired.	A COS message has not been received from the scanner within the Heartbeat Rate * 4.	A COS message has not been received from the device within the Heartbeat Rate * 4.
Cyclic	Both the scanner and the device will issue cyclic messages when-ever the Send Rate timer has expired.	A cyclic message has not been received from the scanner within the Send Rate * 4.	A cyclic message has not been received from the device within the Send Rate * 4.

See also...

- "Expected Packet Rate (EPR)" on page 18
- "Heartbeat Rate" on page 19
- "Send Rate" on page 19

4. CIP Object Implementation

4.1 General Information

The Anybus-M DeviceNet implements the following standard objects:

- Identity Object, Class 01h
- Message Router, Class 02h
- DeviceNet Object, Class 03h
- Assembly Object, Class 04h
- Connection Object, Class 05h
- Acknowledge Handler Object, Class 2Bh

In addition, the following vendor specific objects are implemented:

- Device Keeper Object, Class 8Fh
- Scanner Configuration Object, Class 90h
- Scanlist Object, Class 91h

4.2 Identity Object, Class 01h

4.2.1 General Information

Object Description

-

Implemented Services

Class services: Get Attribute Single

Instance services: Get Attribute All
                       Get Attribute Single
                       Set Attribute Single
                       Reset (see "Service Details: Reset" on page 23)

4.2.2 Class Attributes

#	Access	Name	Type	Value
1	Get	Revision	UINT	0001h
2	Get	Max. Instance	UINT	0001h

4.2.3 Instance Attributes

#	Access	NV	Name	Type	Value
1	Get[a]	No	Vendor ID	UINT	005Ah (HMS Industrial Networks AB)
2	Get[a]	No	Device Type	UINT	000Ch (Communications Adapter)
3	Get[a]	No	Product Code	UINT	0026h (Anybus-M DeviceNet)
4	Get[a]	No	Revision	Struct of: USINT, USINT	(Major fieldbus version) (Minor fieldbus version)
5	Get	No	Status	WORD	(see "Device Status" on page 23)
6	Get	No	Serial Number	UDINT	(assigned at manufacturing)
7	Get[a]	No	Product Name	SHORT_STRING	'Anybus-M DeviceNet'
8	Get	No	State	USINT	-
9	Get	No	CCV	UINT	-
10	Set	Yes	Heartbeat Interval	ISOMT	(default = 0)
14	Set	No	Semaphore	Struct of: UINT, UDINT, ITIME	Client Vendor Number(default = 0) Client Serial Number(default = 0) Millisecond Timer(range: 100... 32767, default = 0)
103	Set	No	Scanner Mode	USINT	Value:Meaning: 0 Run Mode 1 Idle Mode
104[b]	Set	Yes	Slave offline action	USINT	Value:Meaning: 0 Clear 1 Set 2 Freeze (default)

a. Can be customized.
b. This attribute is disabled by default. For more information, see "Enable User Slave Offline Action" on page 71

4.2.4 Device Status

bit(s)	Name
0	Module Owned (A master/scanner has allocated the module)
1	(reserved)
2	Configured (always set to zero)
3	(reserved)
4... 7	Extended Device Status: Value:Meaning: 0000b Unknown 0010b Faulted I/O Connection (not implemented) 0011b No I/O connection established 0100b Non-volatile configuration bad (not implemented) 0110b Connection in Run mode 0111b Connection in Idle mode (other) (reserved)
8	Set for minor recoverable faults
9	Set for minor unrecoverable faults
10	Set for major recoverable faults
11	Set for major unrecoverable faults
12... 15	(reserved)

4.2.5 Service Details: Reset

There are two types of network reset requests on DeviceNet:

- **Type 0: 'Power Cycling Reset'**

  This causes the scanner to restart the DeviceNet software layer. The communication between the application and the scanner remains unaffected.

- **Type 1: 'Out of box reset'**

  This causes the scanner to revert to an 'out of box' configuration, clear the scanlist, and restart the internal DeviceNet software layer. The communication between the application and the scanner remains unaffected.

Optionally, the application can be notified of network reset requests through the Event Notification functionality (RST-bit).

The application can then retrieve the type of reset by means of the 'Get ID Reset Parameter'-command, and perform the desired actions based on this information. Note however that the scanner will still perform the actions described above.

See also...

- "Get ID Reset Parameter" on page 63
- Anybus-S/M Parallel Design Guide ('Event Notification')

4.3 Message Router, Class 02h

4.3.1 General Information

Object Description

-

Supported Services

Class services: -

Instance services: -

4.3.2 Class Attributes

-

4.3.3 Instance Attributes

-

4.4 DeviceNet Object, Class 03h

4.4.1 General Information

Object Description

-

Supported Services

Class   Get Attribute Single

Instance: Get Attribute Single
                     Set Attribute Single
                     Allocate Master/Slave Connection Set (4Bh)
                     Release Group 2 Identifier Set (4Ch)
                     Clear Diagnostic (4Dh)

4.4.2 Class Attributes

#	Access	Name	Type	Value
1	Get	Revision	UINT	0002h

4.4.3 Instance #1 Attributes

#	Access	NV	Name	Type	Value
1	Get (Set)	No	MAC ID[a]	USINT	(actual MAC ID)
2	Get (Set)	No	Baud Rate[a]	USINT	Value:Meaning: 0 Operating at 125 kbps 1 Operating at 250 kbps 2 Operating at 500 kbps
3	Get	No	BOI	BOOL	False
4	Get/Set	No	Bus off Counter	USINT	00h
5	Get	No	Allocation Information	Struct of: BYTE, USINT	 Allocation choice byte MAC ID of master
6	Get	No	MAC ID Switch changed	BOOL	Value:Meaning True MAC ID switches has changed since startup False MAC ID switches has not changed since startup
7	Get	No	Baud rate Switch changed	BOOL	Value:Meaning True Baudrate switches has changed since startup False Baudrate switches has not changed since startup
8	Get	No	MAC ID Switch Value	USINT	(actual value of node address switches)
9	Get	No	Baud Rate Switch Value	USINT	(actual value of baud rate switches)
10	Get, Set	Yes	Quick Connect	BOOL	Value:Meaning False Disable Quick Connect (default) True Enable Quick Connect **Note:** This setting is stored in non-volatile memory.
12	Get, Clear	No	Diagnostic Counters	Struct of: WORD	 Diagnostic Counter Descriptor
				UINT, UINT, UINT, UINT, UINT, UINT, UINT, UINT, UINT	Arbitrary Loss Count(range: 0... 65535) Overload Count(not supported) Bit Error Count(range: 0... 65535) Stuff Error Count(range: 0... 65535) Ack Error Count(range: 0... 65535) Form Error Count(range: 0... 65535) CRC Error Count(range: 0... 65535) Rx Msg. Loss Count(not supported) Warning Error Count(range: 0... 65535) **Note:** These counters are cleared during startup.
				UINT, UINT, USINT[5]	Rx Error Counter(range: 0... 256) Tx Error Counter(range: 0... 256) (reserved)

a. Attributes only settable if enabled see "Set MAC ID and Baud Rate" on page 61.

4.5 Assembly Object, Class 04h

4.5.1 General Information

Object Description

-

Supported Services

Class   -

Instance: Get Attribute Single
                 Set Attribute Single
                 Get Member
                 Set Member

4.5.2 Class Attributes

-

4.5.3 Instance #100 Attributes

#	Access	NV	Name	Type	Value
3	Get	No	Assembly Data	BYTE[ ]	-

4.5.4 Instance #101 Attributes

#	Access	NV	Name	Type	Value
3	Get (Set)	No	Assembly Data	BYTE[ ]	-

Note: This instance is only settable when no active Class 0 I/O connections are in use.

4.6 Connection Object, Class 05h

4.6.1 General Information

Object Description

-

Implemented Services

Class services: -

Instance services: Get Attribute Single
                       Set Attribute Single
                       Reset

4.6.2 Class Attributes

-

4.6.3 Instance #1 Attributes (Explicit Messaging Connection)

#	Access	Name	Type	Value
1	Get	State	USINT	Value:Meaning: 0 Non existent 1 Configuring 3 Established 4 Timeout 5 Deferred delete
2	Get	Instance type	USINT	0000h (Explicit messaging connection)
3	Get	Transport Class trigger	BYTE	83h (Server/Transport Class 3)
4	Get	Produced Connection ID	UINT	(CAN ID for transmission)
5	Get	Consumed Connection ID	UINT	(CAN ID for reception)
6	Get	Initial Comm Characteristics	BYTE	21h
7	Get	Produced Connection Size	UINT	261 bytes
8	Get	Consumed Connection Size	UINT	261 bytes
9	Get, Set	Expected Packet Rate	UINT	09C4h
12	Get, Set	Watchdog timeout action	USINT	Value:Meaning: 1 Auto Delete (Default) 3 Deferred Delete
13	Get	Produced Connection path length	UINT	0000h
14	Get	Produced Connection Path	EPATH	-
15	Get	Consumed Connection path length	UINT	0000h
16	Get	Consumed Connection Path	EPATH	-
17	Get	Production Inhibit Time	UINT	0000h
18	Get, Set	Connection Timeout Multiplier	USINT	Value:Meaning: 0 x4 (default) 1 x8 3 x16 4 x32 5 x64 6 x128 7 x256 8 x512 (other) (reserved)

4.6.4 Instance #2 Attributes (Polled or COS/Cyclic Consuming Connection)

#	Access	Name	Type	Value
1	Get	State	USINT	Value:Meaning: 0 Non existent 1 Configuring 3 Established 4 Timeout
2	Get	Instance type	USINT	1 (I/O Connection)
3	Get	Transport Class trigger	BYTE	Value:Meaning:Type: 80h Server/Transp. Class 0 COS/Cyclic, w.o. Ack 83h Server/Transp. Class 3 Polled or COS/Cyclic w. Ack.
4	Get	Produced Connection ID	UINT	(CAN ID for transmission)
5	Get	Consumed Connection ID	UINT	(CAN ID for reception)
6	Get	Initial Comm Characteristics	BYTE	Value:Meaning: 01h Polled or COS/Cyclic with Ack. Produces over Message Group 1 Consumes over Message Group 2 F1h COS/Cyclic w.o. Ack. Does not produce Consumes over Message Group 2
7	Get	Produced Connection Size	UINT	(size of produced data in bytes)
8	Get	Consumed Connection Size	UINT	(size of consumed data in bytes)
9	Get, Set	Expected Packet Rate	UINT	0
12	Get	Watchdog timeout action	USINT	0 (Transition to the timed out state)
13	Get	Produced Conn. Path length	UINT	Type:Value: COS/Cyclic w.o. Ack. 0 Polled or COS/Cyclic with Ack. 7
14	Get	Produced Connection Path	EPATH	Type:Value: COS/Cyclic w.o. Ack. - Polled or COS/Cyclic with Ack. 20 04 25 64 00 30 03h
15	Get	Consumed Conn. Path length	UINT	7
16	Get	Consumed Connection Path	EPATH	20 04 25 65 00 30 03h
17	Get	Production Inhibit Time	UINT	0
18	Get, Set	Connection Timeout Multiplier	USINT	Value:Meaning: 0 x4 (default) 1 x8 3 x16 4 x32 5 x64 6 x128 7 x256 8 x512 (other) (reserved)

4.6.5 Instance #3 Attributes (Bit-strobe Connection)

#	Access	Name	Type	Value
1	Get	State	USINT	Value:Meaning: 0 Non existent 1 Configuring 3 Established 4 Timeout
2	Get	Instance type	USINT	1 (I/O Connection)
3	Get	Transport Class trigger	BYTE	82h (Server/Transport Class 2)
4	Get	Produced Connection ID	UINT	(CAN ID for transmission)
5	Get	Consumed Connection ID	UINT	(CAN ID for reception)
6	Get	Initial Comm Characteristics	BYTE	02h
7	Get	Produced Connection Size	UINT	(size of produced data in bytes, max. 8 bytes)
8	Get	Consumed Connection Size	UINT	8
9	Get, Set	Expected Packet Rate	UINT	0
12	Get	Watchdog timeout action	USINT	0 (Transition to the timed out state)
13	Get	Produced Connection path length	UINT	7
14	Get	Produced Connection Path	EPATH	20 04 25 64 00 30 03h
15	Get	Consumed Connection path length	UINT	7
16	Get	Consumed Connection Path	EPATH	20 04 25 65 00 30 03h
17	Get	Production Inhibit Time	UINT	0
18	Get, Set	Connection Timeout Multiplier	USINT	Value:Meaning: 0 x4 (default) 1 x8 3 x16 4 x32 5 x64 6 x128 7 x256 8 x512 (other) (reserved)

4.6.6 Instance #4 Attributes (COS/Cyclic Connection)

#	Access	Name	Type	Value
1	Get	State	USINT	Value:Meaning: 0 Non existent 1 Configuring 3 Established 4 Timeout
2	Get	Instance type	USINT	1 (I/O Connection)
3	Get	Transport Class trigger	BYTE	Value:Meaning:Type: 00h Client, Cyclic, Class 0 Non-acknowledged 02h Client, Cyclic, Class 2 Acknowledged 10h Client, COS, Class 0 Non-acknowledged 12h Client, COS, Class 2 Acknowledged
4	Get	Produced Connection ID	UINT	(CAN ID for transmission)
5	Get	Consumed Connection ID	UINT	(CAN ID for reception)
6	Get	Initial Comm Characteristics	BYTE	Value:Meaning: 0Fh Non-acknowledged Produces over Message Group 1 Does not consume 01h Acknowledged Produces over Message Group 1 Consumes over Message Group 2
7	Get	Produced Connection Size	UINT	(size of produced data in bytes)
8	Get	Consumed Connection Size	UINT	(size of consumed data in bytes)
9	Get, Set	Expected Packet Rate	UINT	0
12	Get	Watchdog timeout action	USINT	0 (Transition to the timed out state)
13	Get	Produced Connection path length	UINT	7
14	Get	Produced Connection Path	EPATH	20 04 25 64 00 30 03h
15	Get	Consumed Connection path length	UINT	Type:Value: Non-acknowledged 0 Acknowledged 5
16	Get	Consumed Connection Path	EPATH	Type:Value: Non-acknowledged - Acknowledged 20 2B 25 01 00h
17	Get	Production Inhibit Time	UINT	0
18	Get, Set	Connection Timeout Multiplier	USINT	Value:Meaning: 0 x4 (default) 1 x8 3 x16 4 x32 5 x64 6 x128 7 x256 8 x512 (other) (reserved)

4.6.7 Instance #10... #14 Attributes (Explicit Connection, UCMM Allocated)

#	Access	Name	Type	Value
1	Get	State	USINT	Value:Meaning: 0 Non existent 1 Configuring 3 Established 4 Timeout 5 Deferred delete
2	Get	Instance type	USINT	0000h (Explicit messaging connection)
3	Get	Transport Class trigger	BYTE	83h (Server/Transport Class 3)
4	Get	Produced Connection ID	UINT	(CAN ID for transmission)
5	Get	Consumed Connection ID	UINT	(CAN ID for reception)
6	Get	Initial Comm Characteristics	BYTE	33h
7	Get	Produced Connection Size	UINT	261 bytes
8	Get	Consumed Connection Size	UINT	261 bytes
9	Get, Set	Expected Packet Rate	UINT	09C4h
12	Get	Watchdog timeout action	USINT	1 (Auto Delete)
13	Get	Produced Connection path length	UINT	0000h
14	Get	Produced Connection Path	EPATH	-
15	Get	Consumed Connection path length	UINT	0000h
16	Get	Consumed Connection Path	EPATH	-
17	Get	Production Inhibit Time	UINT	0000h
18	Get, Set	Connection Timeout Multiplier	USINT	Value:Meaning: 0 x4 (default) 1 x8 3 x16 4 x32 5 x64 6 x128 7 x256 8 x512 (other) (reserved)

4.7 Acknowledge Handler Object, Class 2Bh

4.7.1 General Information

Object Description

-

Implemented Services

Class services: -

Instance services: Get Attribute Single
                       Set Attribute Single

4.7.2 Class Attributes

-

4.7.3 Instance Attributes

Instance numbers correlate to the Mac ID of the connected device + 1 (i.e. instance 10 = MAC ID 9).

#	Access	Name	Type	Value
1	Get/Set	Acknowledge Timer	UINT	16
2	Get/Set	Retry Limit	USINT	1
3	Get/Set	Producing Connection Instance	UINT	4

Note: Instances are created when using COS/Cyclic connections.

4.8 Device Keeper Object, Class 8Fh

4.8.1 General Information

Object Description

-

Supported Services

Class services: Get Attribute Single

Instance services: Get Attribute Single
                       Set Attribute Single
                       Get Member
                       Set Member

4.8.2 Class Attributes

#	Access	Name	Type	Value
8	Get	Max. Keeper Space	UDINT	65533
9	Get	Used Keeper Space	UDINT	-

4.8.3 Instance Attributes

Instance numbers correlate to the Mac ID of the connected device + 1 (i.e. instance 10 = MAC ID 9).

#	Access	Name	Type	Value
1	Get	Destination Node	UINT	-
2	Get, Set	Trigger	USINT	-
3	Get	Node CCV	UINT	-
4	Get, Set	Message Block	Struct of: USINT, UINT, USINT[] UINT, USINT[]	 (Service request) (Size of Path) (Path to which the services will be sent) (Length of the Message Data Array) (Service Data)

4.9 Scanner Configuration Object, Class 90h

4.9.1 General Information

Object Description

This object groups information about the configuration in the scanner, and can be changed using a DeviceNet configuration tool or through the mailbox interface. Note that alterations in this object is only permitted in Idle Mode.

Supported Services

Class services: Commit

Instance services: Get Attribute All
                      Set Attribute All
                      Get Attribute List
                      Get Attribute Single
                      Set Attribute Single

4.9.2 Class Attributes

-

4.9.3 Instance Attributes

#	Access	NV	Name	Type	Value
1	Get, Set	Yes	Global EPR	UINT	Default: 75ms
2	Get, Set	Yes	Interscan Delay	UINT	Default: 10ms
3	Get, Set	N/A	NET Stat	USINT	-
4	Get, Set	Yes	Background Poll Rate	UINT	Default: 1
5	Get, Set	Yes	ADR Enable	BOOL	Default: 0
9	Get, Set	N/A	Net Tx Retry	USINT	-
10	Get, Set	No	Faulted Node Table	BOOL[ ]	-
11	Get, Set	No	Idle Node Table	BOOL[ ]	-
12	Get, Set	No	Node Status Table	USINT[ ]	-
13	Get, Set	No	Run/Idle	BOOL	Value:Meaning: 0 Scanner in Idle Mode 1 Scanner in Run Mode
14	Get, Set	No	Scan Counter	UINT	-
15	Get, Set	Yes	CCV	USINT[ ]	Default: 0
16	Get, Set	Yes	AutoScan Enable	BOOL	Value:Meaning: 0 AutoScan Disabled (default) 1 AutoScan Enabled
17	Get, Set	Yes	AutoScan Fixed Mapping Size	USINT	Value:Meaning: 0 Default to a Fixed Mapping Size of 4 bytes 1... 32 Fixed Mapping Size in bytes.
21	Get, Set	No	Active Node Table	BOOL[ ]	-

4.10 Scanlist Object, Class 91h

4.10.1 General Information

Object Description

Each instance within this object represents a node on the network. An instance groups all information associated with the node, i.e. I/O sizes, Vendor ID, Product Code, Product Type etc.

The scanner keeps two copies of this information - a volatile working copy, and another copy stored in non-volatile memory. All changes are carried out in the working copy, which can then be stored in non-volatile memory by means of the 'Commit'-service.

Supported Services

Class services:	Commit	(Saves the scanlist to non-volatile memory)
	Reset	(Clears the entire scanlist)
Instance services:	Get Attribute All	
	Set Attribute All	
	Get Attribute Single	
	Set Attribute Single	
	Reset	(Clears the corresponding node in the scanlist)

4.10.2 Class Attributes

-

4.10.3 Instance Attributes

Instance numbers correlate to the Mac ID of the connected device + 1 (i.e. instance 10 = MAC ID 9).

#	Access	Name	Type	Value

1	Set All, Set Single	Configuration Valid	BOOL	Value:Meaning:
				  0: Not valid
				  1: Valid

2	Set All	DeviceNet port	USINT	0
3	Set All	MAC ID	USINT	0... 63
4	Set All	Slave Vendor	UINT	-
5	Set All	Slave Product Type	UINT	-
6	Set All	Slave Product Code	UINT	-
7	Set All	Scan Type	BYTE	-

8	Set All	Poll Hz	BOOL	Value:Meaning:
				  0: Every scan
				  1: Background Poll

9	Set All	Strobe In Length	USINT	(no. of bytes received from the device after strobe)
10	Set All	Poll In Length	USINT	(no. of bytes received from the device after poll)
11	Set All	COS/Cyclic In Length	USINT	(no. of bytes received from the device after COS)
12	Set All	Poll Out Length	USINT	(no. of bytes sent to the device at poll)
13	Set All	COS/Cyclic Out Length	USINT	(no. of bytes sent to the device at COS)

#	Access	Name	Type	Value
14	Set All	Input Mapping Segment In_DNet_Msg_Type_1 In_DNet_Map_Type_1 In_Dnet_Byte_Off_1 In_DNet_Bit_Off_1 In_MapTable_Length_1 In_MapTable_Off_1	Array of Struct: USINT, USINT, UINT, USINT, UINT, UINT	 1: Map to data table, 0: do not map, other: reserved 1: Map to data table, 0: do not map, other: reserved No. of bytes offset in the DeviceNet message No. of bits offset in the DeviceNet message No. of bits mapped to the data table No. of bits offset in the data table message
15	Set All	Input Mapping Segment Out_DNet_Msg_Type_1 Out_DNet_Map_Type_1 Out_Dnet_Byte_Off_1 Out_DNet_Bit_Off_1 Out_MapTable_Length_1 Out_MapTable_Off_1	Array of Struct: USINT, USINT, UINT, USINT, UINT, UINT	 1: Map to data table, 0: do not map, other: reserved 1: Map to data table, 0: do not map, other: reserved No. of bytes offset in the DeviceNet message No. of bits offset in the DeviceNet message No. of bits mapped to the data table No. of bits offset in the data table message
16	Set All	Slave Revision Major Revision Minor Revision	Struct of: USINT, USINT	 (Major revision) (Minor revision)
17	Set All	EPR/Heartbeat	UINT	(COS/Cyclic heartbeat expected packet rate)
18	Set All	ACK timer	UINT	(ACK timer value used for COS/Cyclic)
19	Set All	Inhibit Timer	UINT	(Inhibit timer)
20	Set All	Option bits	USINT	(Option bits)
21	Set All	Multicast Command	USINT	-
22	Set All	Multicast Response	USINT	-
23	Set All	Device Status	USINT	**Note:** This attribute is treated differently if addressed using Get/Set Single (below)

The following attributes are treated differently if addressed using Set/Get Single.

#	Access	Name	Type	Value
23	Set Single	ADR Active	USINT	1: ADR active, 0: ADR not active
24	Set Single	Quick Connect Active	USINT	1: Quick Connect active, 0: Quick Connect not active
27	Set Single	Multicast ID	USINT	Multicast ID

5. Mailbox Interface

5.1 General Information

The scanner implements the following fieldbus specific mailbox commands:

Command	Command Number	Page
Set DIP-Switch	0001h	41
Set Product Info	0002h	42
Set Product Code	0003h	43
Get Scanlist Instance	0004h	44
Set Scanlist Instance	0005h	45
Get Scanner Configuration Data	0006h	46
Set Scanner Configuration Data	0007h	47
Reset Scanner Configuration	0008h	48
Send Explicit Message	0009h	49
Set Scanner Operation Mode	000Ah	51
Send Explicit Message	000Bh	49
Get DIP-Switch	000Fh	53
Get Total IO Size	0011h	54
Clear Offline Nodes Data	0012h	55
Get Node Status	0015h	56
Get Total Used IO Size	0016h	57
Explicit Message Result	8001h	58
Fieldbus Specific Initialization	0017h	60
Set MAC ID and Baud Rate	0018h	61
Get ID Reset Parameter	0019h	63
Send Explicit Message Extended	001Ah	64
Explicit Request	001Bh	66
Enable Config in Run Mode	001Ch	67
Enable Config Changed Notification	001Dh	68
Config Changed Notification	001Eh	69
Set Scanner Operation Mode Extended	001Fh	70
Enable User Slave Offline Action	0020h	71
Check 4k DPRAM	0021h	72

Note: Commands which are "greyed-out" in the list above are implemented for backwards compatibility only and have been superseded by other commands. It is recommended to use the new commands.

The following error codes can be returned:

Error Code	Description
00h	No error
01h	(reserved)
02h	Module not yet initialized
03h - FAh	(reserved)
FBh	Incorrect string length
FCh	Error in message data, e.g. value out of valid range
FDh	(reserved)
FEh	Scanner is not in idle mode
FFh	Error in mailbox message

5.2 Set DIP-Switch

Note: This command is implemented for backwards compatibility only and have been superseded by other commands. It is recommended to use the new commands.

The command is used to set the baud rate and the MAC ID of the module, used for communcation on the DeviceNet network.

Note: This command may only be issued during initialization.

Command Initiator	Application
Command Number	0001h
Extended Header data	-
Message Data	Contains the data settings that correspond to the dipswitch
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	**Expected response**
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0001h	0001h
Data size	0001h	0001h
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	Dipswitch setting	Dipswitch setting

5.3 Set Product Info

This command is used to customize the network identity, allowing the scanner to appear as a unique implementation rather than a generic Anybus product.

See also...

- "Set Product Code" on page 43

Note: This command may only be issued during initialization.

Command Initiator	Application
Command Number	0002h
Extended Header data	Fault Information
Message Data	Vendor ID, Device Type, Product Code, Revision and Product Name
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0002h	0002h
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)	Vendor ID (high)
Message data byte 2	Vendor ID (low)	Vendor ID (low)
Message data byte 3	Device Type (high)	Device Type (high)
Message data byte 4	Device Type (low)	Device Type (low)
Message data byte 5	Product Code (high)	Product Code (high)
Message data byte 6	Product Code (low)	Product Code (low)
Message data byte 7	Revision (Major)	Revision (Major)
Message data byte 8	Revision (Minor)	Revision (Minor)
Message data byte 9	Product Name Length	Product Name Length
Message data byte 10	Product Name (1st char)	Product Name (1st char)
Message data byte 11	Product Name (2nd char)	Product Name (2nd char)
...	...	...
Message data byte N	Product Name (last char)	Product Name (last char)

Note: Identity information cannot be chosen arbitrarily. Contact HMS and/or the ODVA for further information.

5.4 Set Product Code

This command is used to customize the high byte of the Product Code.

See also...

Note: This command may only be issued during initialization.

Command Initiator	Application
Command Number	0003h
Extended Header data	-
Message Data	Product Code (high byte only)
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0003h	0003h
Data size	0001h	0001h
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 byte 1	Product Code (high)	Product Code (high)

Note: Contact HMS to obtain a valid Product Code.

5.5 Get Scanlist Instance

This command returns the scanlist configuration for a certain MAC ID.

See also...

Command Initiator	Application
Command Number	0004h
Extended Header data	-
Message Data	MAC ID (0... 3Fh)
Response Message	Scanlist configuration for the specified MAC ID

Command and Response Layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0004h	0004h	
Data size	0001h	0065h	
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 byte 1	MAC ID	Scanlist Data Record	**Response data byte 1**
			...
			Response data byte 100
		Status	**Response data byte 101**

See also...

5.6 Set Scanlist Instance

This command adds or removes nodes from the scan list, and specifies the scanlist configuration to be associated with a certain MAC ID.

See also...

- "Get Scanlist Instance" on page 44
- "Reset Scanner Configuration" on page 48
- "Enable Config in Run Mode" on page 67
- "Set Scanner Operation Mode Extended" on page 70

Note: By default, this command may only be issued when the scanner is in Idle Mode.

Command Initiator	Application
Command Number	0005h
Extended Header data	-
Message Data	Scanlist configuration data
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0005h	0005h
Data size	0064h	0064h
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 byte 1 ... Message data byte 100	Scanlist Data Record	Scanlist Data Record

See also...

- "Scanlist Data Record" on page 79

5.7 Get Scanner Configuration Data

This command retrieves the values for the first nine (9) attributes of the Configuration Object.

See also...

Command Initiator	Application
Command Number	0006h
Extended Header data	-
Message Data	-
Response Message	Scanner configuration data

Command and Response Layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0006h	0006h	
Data size	0000h	000Ch	
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	-	-	
		Net EPR (high)	Response data byte 1
		Net EPR (low)	Response data byte 2
		Net ISD (high)	Response data byte 3
		Net ISD (low)	Response data byte 4
		Net Status	Response data byte 5
		Net BPR (high)	Response data byte 6
		Net BPR (low)	Response data byte 7
		Global Option	Response data byte 8
		(reserved, ignore)	Response data byte 9
			Response data byte 10
			Response data byte 11
		Net Tx Retry Count	Response data byte 12

5.8 Set Scanner Configuration Data

This command specifies the scanner configuration data.

See also...

Command Initiator	Application
Command Number	0007h
Extended Header data	-
Message Data	Scanner configuration data.
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0007h	0007h
Data size	0006h	0006h
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 byte 1	Net EPR (high)	Net EPR (high)
Message data byte 2	Net EPR (low)	Net EPR (low)
Message data byte 3	Net ISD (high)	Net ISD (high)
Message data byte 4	Net ISD (low)	Net ISD (low)
Message data byte 5	Back Plane Poll Rate (high)	Back Plane Poll Rate (high)
Message data byte 6	Back Plane Poll Rate (low)	Back Plane Poll Rate (low)

5.9 Reset Scanner Configuration

This command clears the scanlist and sets all scanner configuration settings to factory default values.

See also...

Command Initiator	Application
Command Number	0008h
Extended Header data	-
Message Data	-
Response Message	-

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	-	-

5.10 Send Explicit Message

Note: This command is implemented for backwards compatibility only and have been superseded by other commands. It is recommended to use the new commands.

The command is used to send an explicit DeviceNet message (parameter data) from the application, directly to a node in the network. The module will respond directly to this message as a notification that the explicit message will be sent. When the module has been able to get a result of an explicit message, it will automatically send an explicit message result mailbox telegram to the application.

See also...

- "Explicit Message Result" on page 58

Command Initiator	Application
Command Number	0009h
Extended Header data	-
Message Data	Explicit DeviceNet message data
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	**Expected response**	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0009h	0009h	
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	Status	Status	*See Status code table*
Message data byte 2	TXID	TXID	*Transmission ID*
Message data byte 3	Size	Size	*Data size in bytes*
Message data byte 4	Reserved	Reserved	
Message data byte 5	MAC ID	MAC ID	*Target node ID*
Message data byte 6	Service	Service	*Service code*
Message data byte 7	Explicit message data	Explicit message data	*First byte of message data*
...	...	...	
Message data byte N	Explicit message data	Explicit message data	*Last byte of message data*

The following status codes can be returned:

Status Code	Description
00h	No error
01h	Message completed successfully
02h	Transaction in progress (internal status code)
03h	(reserved)
04h	Error - node offline
05h	Error - DeviceNet port disabled / offline (internal status code)
06h	Error - TXID unknown (internal status code)
07h	Error - duplicate TXID[a]
08h	(reserved)
09h	Error - Scanner out of buffers
0Ah	(reserved)
0Bh	Error - node errored[b]
0Ch	Error - response data too large
0Dh	(reserved)
0Eh	Error - invalid size specified[a]
0Fh	Error - device timed out
10h	Block queued (internal status code)
11h	Block allocated (internal status code)
12h	Connection in progress (internal status code)
13h	Connection errored[b]
14h	Invalid connection format[b]
15h	Connection expired[b]
16h - FFh	(reserved)

a. Available in firmware 1.x and 2.x. Reserved in firmware 3.x
b. Available in firmware 3.x. Reserved in firmware 1.x and 2.x.

5.11 Set Scanner Operation Mode

Note: This command is implemented for backwards compatibility only and have been superseded by other commands. It is recommended to use the new commands.

The command is used to set the operation mode for the scanner. The scanner can be set to run mode or idle mode.

Command Initiator	Application
Command Number	000Ah
Extended Header data	-
Message Data	Operation mode byte
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	000Ah	000Ah	
Data size	0001h	0001h	
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	Operation mode	Operation mode	*0 = run mode, 1 = idle mode*

5.12 Register Class

This command registers objects inside the message router object. When the scanner receives a request towards the registered object, this will be forwarded to the application by means of the 'Explicit Request'-mailbox command.

A total of 128 classes can be registered using this command.

See also...

- "Explicit Request" on page 66

Note: This command may only be issued during initialization.

Command Initiator	Application
Command Number	000Bh
Extended Header data	Fault Information
Message Data	Class ID
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	000Bh	000Bh
Data size	0002h	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	-	Fault Information
Message data byte 1	Class ID (high)	Class ID (high)
Message data byte 2	Class ID (low)	Class ID (low)

- **Class ID**
  CIP Class ID for the class that shall be registered.

5.13 Get DIP-Switch

This command retrieves the value of the on-board switches. This enables the application to read the switch value, alter it as needed, and write it back using 'Set MAC ID and Baud Rate'. Depending on the physical orientation of the scanner, this may be needed to comply with DeviceNet requirements (the DeviceNet specification states that the leftmost/topmost switch shall have the highest significance).

See also...

- "Set MAC ID and Baud Rate" on page 61

Command Initiator	Application
Command Number	000Fh
Extended Header data	-
Message Data	-
Response Message	Logical Switch Value

Command and Response Layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	000Fh	000Fh	
Data size	0000h	0001h	
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	-	-	
		Logical Switch Value	Response data byte

- **Logical Switch Value**

  Each bit corresponds to a switch value as follows:

Switch:	S8	S7	S6	S5	S4	S3	S2	S1
Bit:	b7	b6	b5	b4	b3	b2	b1	b0

  0: Switch in 'OFF'-position
  1: Switch in 'ON'-position

5.14 Get Total IO Size

This command returns the total Input- and Output Data sizes in bytes.

See also...

Command Initiator	Application
Command Number	0011h
Extended Header data	-
Message Data	-
Response Message	Total Input- and Output Data sizes.

Command and Response Layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0011h	0011h	
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	-	-	
		Total Input Data Size	**Response data byte 1**
		Total Output Data Size	**Response data byte 2**

- **Total Input Data Size**

  Total input size; equals the sum of Strobe In Length, Poll In Length and COS/Cyclic In Length.

- **Total Output Data Size**

  Total output size; equals the sum of Poll Out Length and COS/Cyclic Out Length.

5.15 Clear Offline Nodes Data

By default, the data associated with a slave is frozen when the slave goes off line. This command instructs the scanner to clear the data instead.

This command is included for backwards compatibility only. For new implementations, it is recommended to use 'Enable User Slave Offline Action', which allows the end user to specify the offline action through the Identity Object. It can be sent anytime after initialization has started, but it is strongly recommended to send it before initialization is finished.

See also...

- "Enable User Slave Offline Action" on page 71

Note 1: This command is mutual exclusive with 'Enable User Slave Offline Action'.

Note 2: The command can be sent anytime after initialization has started, but it is strongly recommended to send it before initialization is finished

Command Initiator	Application
Command Number	0012h
Extended Header data	-
Message Data	-
Response Message	-

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0012h	0012h
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	-	-

5.16 Get Node Status

This command returns the current node status for the scanner.

Command Initiator	Application
Command Number	0015h
Extended Header data	-
Message Data	-
Response Message	Device State 1 and 2.

Command and Response Layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0015h	0015h	
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	-	-	
		Device State 2	Response data byte 1
		Device State 1	Response data byte 2

- **Device State 1**

  See "Status Area" on page 74

- **Device State 2**

  See "Status Area" on page 74

5.17 Get Total Used IO Size

This command is similar to Get Total I/O Size, but also includes any offset added to the data.It is also possible to specify whether to include inactive nodes in the calculation.

See also...

- "Get Total IO Size" on page 54

Command Initiator	Application
Command Number	0016h
Extended Header data	Mode
Message Data	-
Response Message	Used Input- and Output Data sizes.

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0016h	0016h
Data size	0000h	0002h
Frame count	0001h	0001h
Frame number	0001h	0001h
Offset high	0000h	0000h
Offset low	0000h	0000h
Extended word 1	Mode	Mode
Extended word 2	-	-
Extended word 3	-	-
Extended word 4	-	-
Extended word 5	-	-
Extended word 6	-	-
Extended word 7	-	-
Extended word 8	-	-
		Used Input Data Size **Response data byte 1**
		Used Output Data Size **Response data byte 2**

- **Mode**

    0:    Include active nodes only
    1:    Include active as well as inactive nodes

- **Used Input Data Size**

    Total input size + any offsets that may be added to the data.

- **Used Output Data Size**

    Total output size + any offsets that may be added to the data.

5.18 Explicit Message Result

Note: This command is implemented for backwards compatibility only and have been superseded by other commands. It is recommended to use the new commands.

The command is gnerated by the Anybus M module when an explicit message task has been completed. It returns the result of the explicit message task to the application. Note that the applications shall not send any response command to the Anybus module when this command is received.

See also...

Command Initiator	Anybus M module
Command Number	8001h
Extended Header data	-
Message Data	Explicit DeviceNet message data, sent earlier in a Send Explicit Message command.
Response Message	The application shall not respond to this message

Command and Response Layout

	Command	Expected response
Message ID	(ID)	-
Message information	4002h	-
Command	8001h	-
Data size	(size)	-
Frame count	0001h	-
Frame number	0001h	-
Offset high	0000h	-
Offset low	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 byte 1	Status	-
Message data byte 2	TXID	-
Message data byte 3	Size	-
Message data byte 4	Reserved	-
Message data byte 5	MAC ID	-
Message data byte 6	Service	-
Message data byte 7	Explicit message data	-
...	...	...
Message data byte N	Explicit message data	-

The following status codes can be returned:

Status Code	Description
00h	No error
01h	Message completed successfully
02h	Transaction in progress (internal status code)
03h	(reserved)
04h	Error - node offline
05h	Error - DeviceNet port disabled / offline (internal status code)
06h	Error - TXID unknown (internal status code)
07h	Error - duplicate TXID[a]
08h	(reserved)
09h	Error - Scanner out of buffers
0Ah	(reserved)
0Bh	Error - node errored[b]
0Ch	Error - response data too large
0Dh	(reserved)
0Eh	Error - invalid size specified[a]
0Fh	Error - device timed out
10h	Block queued (internal status code)
11h	Block allocated (internal status code)
12h	Connection in progress (internal status code)
13h	Connection errored[b]
14h	Invalid connection format[b]
15h	Connection expired[b]
16h - FFh	(reserved)

a. Available in firmware 1.x and 2.x. Reserved in firmware 3.x
b. Available in firmware 3.x. Reserved in firmware 1.x and 2.x.

5.19 Fieldbus Specific Initialization

This command specifies additional information not present in ANYBUS_INIT.

See also...

- "Memory Maps" on page 11

Command Initiator	Application
Command Number	0017h
Extended Header data	-
Message Data	Mode
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0017h	0017h
Data size	0001h	0001h
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 byte 1	Mode	Mode

- **Mode**

    0:    2kbyte DPRAM memory map
    1:    4kbyte DPRAM memory map

    Note: 4kbyte DPRAM operation requires the use of pin 34 as an extra address pin. For more information, consult the Anybus-S/M Parallel Design Guide.

5.20 Set MAC ID and Baud Rate

This command can be used to specify the MAC ID and Baud Rate and overrides the on-board switches regardless of their actual value.

See also...

- "Get DIP-Switch" on page 53

Note 1: In order for the scanner to accept the new settings, the command must be issued during initialization. If issued during runtime, the scanner will indicate that the switches has changed and update the information in the DeviceNet object.

Note 2: This command supersedes the 'Set Dipswitch'-command found in older revisions of the product. The scanner is fully backwards compatible with the old implementation.

Command Initiator	Application
Command Number	0018h
Extended Header data	-
Message Data	MAC ID and Baud Rate settings
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	**Expected response**
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0018h	0018h
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	-	-
Message data byte 1	MAC ID Source	MAC ID Source
Message data byte 2	MAC ID Switch	MAC ID Switch
Message data byte 3	Baud Rate Source	Baud Rate Source
Message data byte 4	Baud Rate Switch	Baud Rate Switch

- **MAC ID Source**

    00h: Use MAC ID Value (below)
    01h: Use value received from network
    (other)(reserved for future use)

- **MAC ID Value**

    00... 3Fh:MAC ID Value
    40... 63h:Invalid communication setting
    (other)(reserved for future use)

- **Baud Rate Source**

    00h: Use Baud Rate Value (below)
    01h: Use value received from network
    02h: Auto baud
    (other)(reserved for future use)

- **Baud Rate Value**

    00h: 125kbps
    01h: 250kbps
    02h: 500kbps
    03... 09h:Invalid communication setting
    (other)(reserved for future use)

5.21 Get ID Reset Parameter

This command allows the application to establish the type of the last reset-request (issued towards the Identity Object) received from the network.

Command Initiator	Application
Command Number	0019h
Extended Header data	-
Message Data	-
Response Message	Type

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0019h	0019h
Data size	0000h	0001h
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	-	-
		Type → **Response data byte**

- **Type**

    00h: Power-on reset
    01h: Out-of-box configuration
    FFh: No reset received

5.22 Send Explicit Message Extended

This command allows the application to issue an explicit message towards a node on the network. The scanner will not respond to this message until a response is received from the specified node (or if the request times out). The total request size is limited to 256 bytes (the size of the mailbox data field).

See also...

- • "Send Explicit Message" on page 49
- • "Explicit Request" on page 66

Note: This command may only be issued during runtime.

Command Initiator	Application
Command Number	001Ah
Extended Header data	Destination Host, Extended Error Code, Error Code
Message Data	Unconnected message
Response Message	Response message

Command and Response Layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	001Ah	001Ah	
Data size	(size)	(size)	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	Destination Host	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	Extended Error Code	*See table below*
Extended word 8	-	Error Code	
Message data byte 1	Service Code	Service Reply	
Message data byte 2	Request Path Size (in words)	00h	
Message data byte 3	Padded EPATH	General Status	
...	Optional service data	Add. Status Size (in words)	
...		Add. Status Data	
Message data byte N		Optional Data	

Extended Error Codes

Error Code	Description
0	No error
1	Message completed successfully
4	Node offline
9	Scanner out of buffers
11	Node errored
12	Response data too large
15	Device timed out
19	Connection errored
20	Invalid connection format
21	Connection expired
2, 3, 5 - 8, 10, 13, 14, 16 - 18, 22 - 255	(reserved)

5.23 Explicit Request

The scanner will issue this command upon receiving a network request towards a CIP object previously been registered by the application. The application shall process the message and form a suitable response, which will then be returned to the originator of the network request.

See also...

- "Send Explicit Message" on page 49

Command Initiator	Anybus
Command Number	001Bh
Extended Header data	Destination
Message Data	Unconnected message
Response Message	Response message

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	001Bh	001Bh
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	-	-
Message data byte 1	Service Code	Service Reply
Message data byte 2	Request Path Size (in words)	00h
Message data byte 3	Padded EPATH	General Status
...		Add. Status Size (in words)
...	Optional service data	Add. Status Data
Message data byte N		Optional Data

5.24 Enable Config in Run Mode

To stay backwards compatible with older implementations of the product, the scanlist can by default only be accessed in Idle Mode. This command changes the default behaviour and enables configuration tools to alter the scanlist in Run Mode as well.

See also...

Command Initiator	Application
Command Number	001Ch
Extended Header data	-
Message Data	-
Response Message	-

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	001Ch	001Ch
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	-	-

5.25 Enable Config Changed Notification

This command enables the 'Config Changed Notification'-functionality.

See also...

- "Config Changed Notification" on page 69

Note: This command may only be issued during initialization.

Command Initiator	Application
Command Number	001Dh
Extended Header data	-
Message Data	-
Response Message	-

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	001Dh	001Dh
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	-	-

5.26 Config Changed Notification

If enabled, the scanner issues this command to signal that the scanlist has been altered (i.e. when the configured I/O sizes changes, or when the non-volatile contents of the Scanner Configuration Object and Scanlist Object changes).

See also...

- "Enable Config Changed Notification" on page 68

Note: This functionality is disabled by default.

Command Initiator	Anybus
Command Number	001Eh
Extended Header data	-
Message Data	-
Response Message	-

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	001Eh	001Eh
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	-	-

5.27 Set Scanner Operation Mode Extended

This command specifies the operation mode for the scanner.

See also...

- "Set Scanlist Instance" on page 45
- "Enable Config in Run Mode" on page 67

Note: This command supersedes the 'Set Scanner Operation Mode'-command. The scanner is however fully backwards compatible with the older implementation.

Command Initiator	Application
Command Number	001Fh
Extended Header data	-
Message Data	Mode, Network Change
Response Message	(the response holds a copy of the command data)

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	001Fh	001Fh
Data size	0002h	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 byte 1	Mode	Mode
Message data byte 2	Network Change	Network Change

- **Mode**

  0:   Run Mode
  1:   Idle Mode

- **Network Change**

  0:   Allow the operation mode to be set from the network
  1:   Don't allow the operation mode to be set from the network

5.28 Enable User Slave Offline Action

By default, the data associated with a slave is frozen when the slave goes off line. This command enables the end user to specify the offline action through the Identity Object.

See also...

- "Clear Offline Nodes Data" on page 55

Note 1: This command is mutual exclusive with 'Clear Offline Nodes Data'.

Note 2: This command may only be sent during initialization.

Command Initiator	Application
Command Number	0020h
Extended Header data	-
Message Data	-
Response Message	-

Command and Response Layout

	Command	Expected response
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0020h	0020h
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	-	-

5.29 Check 4k DPRAM

This command performs a RAM test of over 4k of DPRAM.

Note: This command may only be sent during initialization.

Command Initiator	Application
Command Number	0021h
Extended Header data	-
Message Data	-
Response Message	If the test is successful, a respons without the error bit is returned. If the test fails, the error bit will be set returning the INVALID_OTHER error.

Command and Response Layout

	Command	**Expected response**
Message ID	(ID)	(ID)
Message information	4002h	0002h
Command	0021h	0021h
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	-	-

6. Fieldbus Specific Area

6.1 Register Map

Address	Contents
640h... 647h	Status Area
648h... 64Fh	Node Active (bit-field)
650h... 657h	Node Idle (bit-field)
658h... 65Fh	Node Faulted (bit-field)
660h... 69Fh	Node Status (byte-field)
6A0h... 7BFh	(reserved for future use)

6.2 Status Area

The contents in this area reflects the overall status of the scanner.

Location	Contents	Description
640h	Active Connections	Number of established connections
641h		
642h	Device State 1	Bit-coded status information (below)
643h	Device State 2	Bit-coded status information (below)
644h	Expected Packet Rate	Expected packet rate for polled and bit-strobe I/O connections
645h		
646h	DIP settings	Reflects the value of the on-board switches
647h	Scan flags	Bit-coded status information (below)

'Device State 1' bit field:

Bit	Contents	Description
0	Autobaud	-
1	In Dup Mac Check	
2	Online	
3	Bus Off	
4	Dup Mac Fail	
5	Disabled	
6	No Net Power	
7	NVS Update	

'Device State 2' bit field:

Bit	Contents	Description
0	Net Fault	-
1... 7	(reserved)	(reserved for future use, mask off and ignore)

'Scan flags' bit field:

Bit	Contents	Description
0	(reserved)	(reserved for future use, mask off and ignore)
1	Poll	Set when the ISD timer has expired and the scanner shall produce data on established poll connections.
2	ISD Active	Set while the scanner is waiting for the 'Inter Scan Delay'-timer (ISD) to expire. When the timer has expired, the master produces and sends data on all I/O connections that are using the ISD timer.
3	(reserved)	(reserved for future use, mask off and ignore)
4	Idle Mode	Set when the scanner is in Idle Mode.
5	(reserved)	(reserved for future use, mask off and ignore)
6	Strobe Active	Set when the master has active bit-strobe connections
7	(reserved)	(reserved for future use, mask off and ignore)

6.3 Node Active (bit-field)

Each bit in this area corresponds to a node[1] on the network.

Location	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
648h	Node 7	Node 6	Node 5	Node 4	Node 3	Node 2	Node 1	Node 0
649h	Node 15	Node 14	Node 13	Node 12	Node 11	Node 10	Node 9	Node 8
64Ah	Node 23	Node 22	Node 21	Node 20	Node 19	Node 18	Node 17	Node 16
64Bh	Node 31	Node 30	Node 29	Node 28	Node 27	Node 26	Node 25	Node 24
64Ch	Node 39	Node 38	Node 37	Node 36	Node 35	Node 34	Node 33	Node 32
64Dh	Node 47	Node 46	Node 45	Node 44	Node 43	Node 42	Node 41	Node 40
64Eh	Node 55	Node 54	Node 53	Node 52	Node 51	Node 50	Node 49	Node 48
64Fh	Node 63	Node 62	Node 61	Node 60	Node 59	Node 58	Node 57	Node 56

Bit value:

0:	Node has no active connections
1:	Node has one or more active connections

6.4 Node Idle (bit-field)

Each bit in this area corresponds to a node[1] on the network.

Location	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
650h	Node 7	Node 6	Node 5	Node 4	Node 3	Node 2	Node 1	Node 0
651h	Node 15	Node 14	Node 13	Node 12	Node 11	Node 10	Node 9	Node 8
652h	Node 23	Node 22	Node 21	Node 20	Node 19	Node 18	Node 17	Node 16
653h	Node 31	Node 30	Node 29	Node 28	Node 27	Node 26	Node 25	Node 24
654h	Node 39	Node 38	Node 37	Node 36	Node 35	Node 34	Node 33	Node 32
655h	Node 47	Node 46	Node 45	Node 44	Node 43	Node 42	Node 41	Node 40
656h	Node 55	Node 54	Node 53	Node 52	Node 51	Node 50	Node 49	Node 48
657h	Node 63	Node 62	Node 61	Node 60	Node 59	Node 58	Node 57	Node 56

Bit value:

0:	Node is in run mode
1:	Node is idle

---

1. Node: a module on the network corresponding to a certain MAC ID.

6.5 Node Faulted (bit-field)

Each bit in this area corresponds to a node[1] on the network.

Location	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
658h	Node 7	Node 6	Node 5	Node 4	Node 3	Node 2	Node 1	Node 0
659h	Node 15	Node 14	Node 13	Node 12	Node 11	Node 10	Node 9	Node 8
65Ah	Node 23	Node 22	Node 21	Node 20	Node 19	Node 18	Node 17	Node 16
65Bh	Node 31	Node 30	Node 29	Node 28	Node 27	Node 26	Node 25	Node 24
65Ch	Node 39	Node 38	Node 37	Node 36	Node 35	Node 34	Node 33	Node 32
65Dh	Node 47	Node 46	Node 45	Node 44	Node 43	Node 42	Node 41	Node 40
65Eh	Node 55	Node 54	Node 53	Node 52	Node 51	Node 50	Node 49	Node 48
65Fh	Node 63	Node 62	Node 61	Node 60	Node 59	Node 58	Node 57	Node 56

Bit value:

0:	Node operating correctly
1:	Node faulted

For more information of the fault of the node see:

- "Node Status (byte-field)" on page 77

---

1. Node: a module on the network corresponding to a certain MAC ID.

6.6 Node Status (byte-field)

Each byte in represent a node[1] on the network. The contents of the byte tells the status of the corresponding node, or if the node is faulted, an error code is presented.

Location	Node	Description
660h	0	-
661h	1	
662h	2	
663h	3	
664h	4	
665h	5	
666h	6	
...	...	
69Fh	63	

The status value for each node is interpreted as follows:

Value	Meaning	Description
0	OK	Device is OK
70	DUP_MAC_FAILURE	Device has failed to send it's Dup Mac message
72	DEVICE_COMM_FAILURE	Device stopped communicating
73	WRONG_DEV_TYPE	Device does not match scan list.
75	NETWORK_FAILURE	Network communication has failed.
76	NO_MESSAGE_FOR_SCANNER	Timeout with no net traffic for scanner
77	WRONG_SIZE_DATA	Data size returned does not match scanlist.
78	NO_SUCH_DEVICE	Device in scanlist does not answer.
79	TRANSMIT_FAILURE	Failed to transmit message.
80	IN_IDLE_MODE	Device is in idle mode operation.
81	IN_FAULT_MODE	Device is in fault mode operation.
83	SLAVE_INIT_ERROR	Device refused to be initialized.
84	NOT_YET_INITIALIZED	Device is not yet initialized
85	RUN_TIME_DATA_SIZE_ERR	Data incorrect for this connection
86	DEVICE_WENT_IDLE	Device went into idle itself.
87	SHARED_MASTER_ERROR	Shared master has not allocated slave.
88	SHARED_CHOICE_ERROR	Shared master has not allocated required choices.
89	KEEPER_FAILED	Keeper download failed.
90	CAN_PORT_DISABLED	CAN Port has been disabled.
91	PORT_BUS_OFF	Bus off detected.
92	PORT_POWER_OFF	No net power
93	CONFIGURATION_CRC_FAILURE	CRC failure detected on configuration data.
95	FLASH_UPDATE_IN_PROGRESS	Flash is being modified by tool
98	FIRMWARE_FAILURE	Esc, Overflow, Divide or other proc error.
(other)	-	(reserved for future use)

---

1. Node: a module on the network corresponding to a certain MAC ID.

7. Control Register Area

Fieldbus Type

The fieldbus type value for this product is 0025h (DeviceNet).

Module Type

The module type value for this product is 0201h (Anybus-M).

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

If the application has enabled the Watchdog Counter Input and doesn't update it properly, the scanner will reset the CAN-controller and go to the offline state.

The Module Status LED will indicate a major fault.

Event Notification Cause/Source Registers

- **Fieldbus Online (FBON)**

  The scanner indicates fieldbus online when all configured slaves are up and running, exchanging I/O data.

- **Fieldbus Offline (FBOF)**

  The scanner indicates fieldbus offline when the scanner has no configured slaves or when any one slave has stopped exchanging data.

- **Data Changed (DC)**

  The scanner supports the Data Changed indication.

A. Data Structures

A.1 Scanlist Data Record

A.1.1 General Information

This structure correlates to an instance in the scanlist configuration.

A.1.2 Structure

Offset	Contents	Comments
0	Config Valid	-
1	DNet Port	-
2	MAC ID	-
3	Vendor ID (high)	-
4	Vendor ID (low)	
5	Product Type (high)	-
6	Product Type (low)	
7	Product code (high)	-
8	Product code (low)	
9	Scan type	-
10	Poll rate	-
11	Strobe response length	-
12	Strobe command length	-
13	Poll response length	-
14	COS cyclic response length	-
15	Poll command length	-
16	COS cyclic command length	-
17	In 1 message type	-
18	In 1 map type	
19	In 1 byte offset (high)	
20	In 1 byte offset (low)	
21	In 1 bit offset	
22	In 1 image length (high)	
23	In 1 image length (low)	
24	In 1 data offset (high)	
25	In 1 data offset (low)	
26	In 2 message type	-
27	In 2 map type	
28	In 2 byte offset (high)	
29	In 2 byte offset (low)	
30	In 2 bit offset	
31	In 2 image length (high)	
32	In 2 image length (low)	
33	In 2 data offset (high)	
34	In 2 data offset (low)	

Offset	Contents	Comments
35	In 3 message type	-
36	In 3 map type	
37	In 3 byte offset (high)	
38	In 3 byte offset (low)	
39	In 3 bit offset	
40	In 3 image length (high)	
41	In 3 image length (low)	
42	In 3 data offset (high)	
43	In 3 data offset (low)	
44	In 4 message type	-
45	In 4 map type	
46	In 4 byte offset (high)	
47	In 4 byte offset (low)	
48	In 4 bit offset	
49	In 4 image length (high)	
50	In 4 image length (low)	
51	In 4 data offset (high)	
52	In 4 data offset (low)	
53	Out 1 message type	-
54	Out 1 map type	
55	Out 1 byte offset (high)	
56	Out 1 byte offset (low)	
57	Out 1 bit offset	
58	Out 1 image length (high)	
59	Out 1 image length (low)	
60	Out 1 data offset (high)	
61	Out 1 data offset (low)	
62	Out 2 message type	-
63	Out 2 map type	
64	Out 2 byte offset (high)	
65	Out 2 byte offset (low)	
66	Out 2 bit offset	
67	Out 2 image length (high)	
68	Out 2 image length (low)	
69	Out 2 data offset (high)	
70	Out 2 data offset (low)	
71	Out 3 message type	-
72	Out 3 map type	
73	Out 3 byte offset (high)	
74	Out 3 byte offset (low)	
75	Out 3 bit offset	
76	Out 3 image length (high)	
77	Out 3 image length (low)	
78	Out 3 data offset (high)	
79	Out 3 data offset (low)	

Offset	Contents	Comments
80	Out 4 message type	-
81	Out 4 map type	
82	Out 4 byte offset (high)	
83	Out 4 byte offset (low)	
84	Out 4 bit offset	
85	Out 4 image length (high)	
86	Out 4 image length (low)	
87	Out 4 data offset (high)	
88	Out 4 data offset (low)	
89	Major rev	-
90	Minor rev	
91	EPR (high)	-
92	EPR (low)	
93	Ack time (high)	-
94	Ack time (low)	
95	Inhibit time (high)	-
96	Inhibit time (low)	
97	Options	-
98	Multicast command	-
99	Multicast response	-

A.1.3 Example, Slave Record Structure

Overview

This example corresponds to an Anybus-CompactCom DeviceNet with the following properties:

- Mac ID 3
- 8 bytes of Input data
- 8 bytes of Output data
- Input data mapped at byte offset 2
- Output data mapped at byte offset 4
- Polled Connection
- Poll every scan cycle

Data Structure

Offset	Contents	Value	Comment
1	Config Valid	01h	1: Slave is active and exchanges IO data 0: Slave is inactive and doesn't exchange IO data
2	DNet Port	00h	Always 0 (zero)
3	MAC ID	03h	MAC ID 3
4	Vendor ID (high)	00h	HMS Vendor ID (005Ah)
5	Vendor ID (low)	5Ah	
6	Product Type (high)	00h	Product Type (0000h, Generic Device)
7	Product Type (low)	00h	
8	Product code (high)	00h	Product Code 0062h (Anybus-CompactCom DeviceNet)
9	Product code (low)	62h	
10	Scan type	01h	Polled Only connection
11	Poll rate	00h	Poll at every poll cycle
12	Strobe response length	00h	No Bit Strobed response data
13	Strobe command length	00h	No Bit Strobed command data
14	Poll response length	08h	8 Bytes polled response data
15	COS cyclic response length	00h	No cyclic response data
16	Poll command length	08h	8 Bytes polled command data
17	COS cyclic command length	00h	No cyclic command data
18	In 1 message type	01h	Message type: Polled
19	In 1 map type	00h	(not used)
20	In 1 byte offset (high)	00h	Offset in message to map (0000h)
21	In 1 byte offset (low)	00h	
22	In 1 bit offset	00h	(no bit offset in message to map from)
23	In 1 image length (high)	00h	Data length in bits (0040h)
24	In 1 image length (low)	40h	
25	In 1 data offset (high)	00h	Byte offset in input area (0002h)
26	In 1 data offset (low)	02h	

Offset	Contents	Value	Comment
27	In 2 message type	00h	(other connection types may be mapped here)
28	In 2 map type	00h	
29	In 2 byte offset (high)	00h	
30	In 2 byte offset (low)	00h	
31	In 2 bit offset	00h	
32	In 2 image length (high)	00h	
33	In 2 image length (low)	00h	
34	In 2 data offset (high)	00h	
35	In 2 data offset (low)	00h	
36	In 3 message type	00h	
37	In 3 map type	00h	
38	In 3 byte offset (high)	00h	
39	In 3 byte offset (low)	00h	
40	In 3 bit offset	00h	
41	In 3 image length (high)	00h	
42	In 3 image length (low)	00h	
43	In 3 data offset (high)	00h	
44	In 3 data offset (low)	00h	
45	In 4 message type	00h	
46	In 4 map type	00h	
47	In 4 byte offset (high)	00h	
48	In 4 byte offset (low)	00h	
49	In 4 bit offset	00h	
50	In 4 image length (high)	00h	
51	In 4 image length (low)	00h	
52	In 4 data offset (high)	00h	
53	In 4 data offset (low)	00h	
54	Out 1 message type	01h	Message Type: Polled
55	Out 1 map type	00h	(not used)
56	Out 1 byte offset (high)	00h	Offset in message to map (0000h)
57	Out 1 byte offset (low)	00h	
58	Out 1 bit offset	00h	(no bit offset in message to map from)
59	Out 1 image length (high)	00h	Data length in bits (0040h)
60	Out 1 image length (low)	40h	
61	Out 1 data offset (high)	00h	Byte offset in output area (0004h)
62	Out 1 data offset (low)	04h	

Offset	Contents	Value	Comment
63	Out 2 message type	00h	(other connection types may be mapped here)
64	Out 2 map type	00h	
65	Out 2 byte offset (high)	00h	
66	Out 2 byte offset (low)	00h	
67	Out 2 bit offset	00h	
68	Out 2 image length (high)	00h	
69	Out 2 image length (low)	00h	
70	Out 2 data offset (high)	00h	
71	Out 2 data offset (low)	00h	
72	Out 3 message type	00h	
73	Out 3 map type	00h	
74	Out 3 byte offset (high)	00h	
75	Out 3 byte offset (low)	00h	
76	Out 3 bit offset	00h	
77	Out 3 image length (high)	00h	
78	Out 3 image length (low)	00h	
79	Out 3 data offset (high)	00h	
80	Out 3 data offset (low)	00h	
81	Out 4 message type	00h	
82	Out 4 map type	00h	
83	Out 4 byte offset (high)	00h	
84	Out 4 byte offset (low)	00h	
85	Out 4 bit offset	00h	
86	Out 4 image length (high)	00h	
87	Out 4 image length (low)	00h	
88	Out 4 data offset (high)	00h	
89	Out 4 data offset (low)	00h	
90	Major rev	02h	Rev 2.1
91	Minor rev	01h	
92	EPR (high)	00h	Expected Packet Rate (0096h)
93	EPR (low)	96h	
94	Ack time (high)	00h	Acknowledgement Time
95	Ack time (low)	00h	
96	Inhibit time (high)	00h	Inhibit Time
97	Inhibit time (low)	00h	
98	Options	00h	-
99	Multicast command	00h	
100	Multicast response	00h	

# B. Connectors

B.1 Application Interface

(Consult the Anybus-S/M Parallel Interface Design Guide for further information).

B.2 DeviceNet Connector

The scanner supports both 5.08mm and 3.84mm pluggable screw connectors, as well as a 10 pin 2mm board to board connector.

Pluggable Screw (5.08 and 3.84mm)

Pin	Signal	Description
1	V-	Negative supply voltage[a]
2	CAN_L	CAN_L bus line
3	SHIELD	Cable shield
4	CAN_H	CAN_H bus line
5	V+	Positive supply voltage[a]
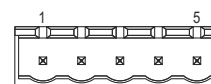
a. The scanner requires 24VDC bus power.
   See also Appendix "Supply Voltage" on page 88

2mm Board to Board

| Pin	Signal	Description
1	SHIELD	Cable shield
2	-	-
3	CAN_L	CAN_L bus line
4	V-	Negative supply voltage[a]
5	CAN_H	CAN_H bus line
6	V-	Negative supply voltage[a]
7	-	-
8	V+	Positive supply voltage[a]
9	-	-
10	SHIELD	Cable shield

a. The scanner requires 24VDC bus power.
   See also Appendix "Supply Voltage" on page 88

C. Mechanical Specification

All measurements expressed in this chapter have a tolerance of ±0.25mm unless otherwise stated.

C.1 Measurements, Connectors & Switches
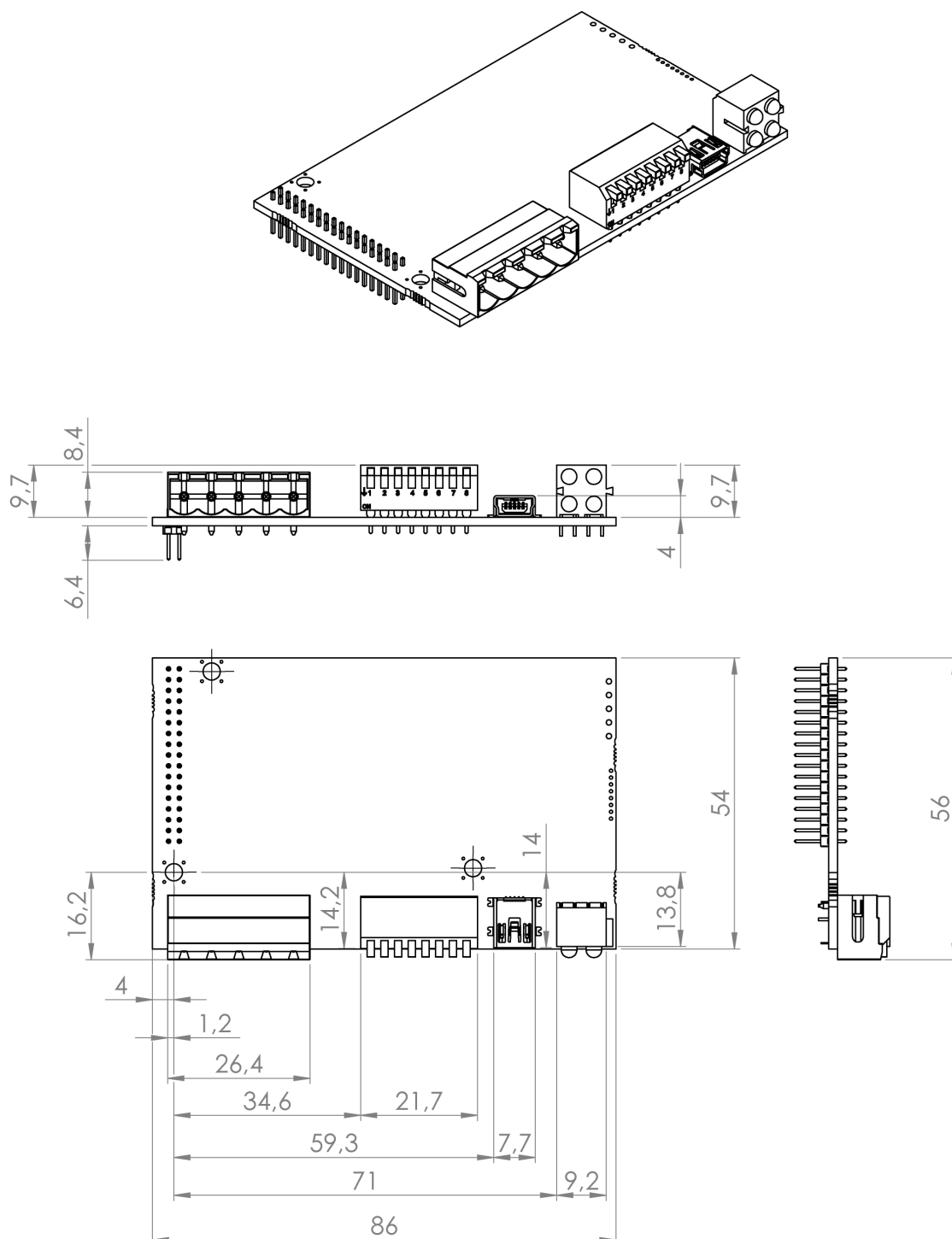
D. Technical Specification

D.1 Electrical Specification

D.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/M Parallel Design Guide. HMS cannot guarantee proper EMC behaviour unless this requirement is fulfilled.

D.1.2 Supply Voltage

The module electronics requires a regulated 5VDC power supply as specified by the Anybus-S/M Parallel Design Guide. In addition, the bus interface requires 11... 25VDC power source as stated in the DeviceNet specification.

D.1.3 Power Consumption

The maximum current consumption for this product is 140 mA on the application interface, and 50 mA on the bus interface.

D.2 Environmental Specification

- **Temperature**
  Test performed according to IEC-60068-2-1 and IEC 60068-2-2.
  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 93% non-condensing.
  Test performed according to IEC 60068-2-30 and IEC 60068-2-78.

D.3 EMC Compliance (CE)

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

- **Emission:** SS-EN 61000-6-4:2007

  Tested perSS-EN 55016-2-3:2006, class A, radiated

  (SS-EN 55011:2007, class A, radiated)

- **Immunity:** SS-EN 61000-6-2: 2001

  Tested perSS-EN 61000-4-2:1995

  SS-EN 61000-4-3:2006
  SS-EN 61000-4-4:2005
  SS-EN 61000-4-5:2006
  SS-EN 61000-4-6:2007