

X-gateway Interface Addendum DeviceNet Scanner

Doc: HMSI-27-247, Rev: 2.00



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Important User Information

This document is intended to provide a good understanding of the functionality offered by the Interface described here.

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

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Trademark Acknowledgements

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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.

Table of Contents

	Important User Information	
	<i>Liability</i>	2-2
	<i>Intellectual Property Rights</i>	2-2
	<i>Trademark Acknowledgements</i>	2-2
Preface	About This Document	
	How To Use This Document	P-5
	Related Documents	P-5
	Document History	P-5
	Conventions & Terminology	P-5
	Sales and Support	P-6
Chapter 1	About the DeviceNet Scanner Interface	
	General Information	1-7
	Features	1-7
	DeviceNet Status LEDs	1-8
	<i>Connectors & Switches</i>	1-8
Chapter 2	Installation and Configuration	
	Configuration Switches	2-9
	<i>Baud Rate Configuration</i>	2-9
	<i>Mac ID Configuration</i>	2-9
	Gateway Config Interface	2-10
	DeviceNet Scanlist Configuration	2-11
	<i>Anybus NetTool DN</i>	2-11
	<i>Configuration Example</i>	2-12
Chapter 3	Data Exchange	
	General Information	3-13
	Control & Status Word Details	3-14
	<i>Control Word</i>	3-14
	<i>Status Word</i>	3-14
	Live List Interpretation	3-15

Chapter 4 CIP Object Implementation

General Information.....	4-16
Identity Object, Class 01h.....	4-17
<i>General Information</i>	4-17
<i>Class Attributes</i>	4-17
<i>Instance Attributes</i>	4-17
Message Router, Class 02h.....	4-18
<i>General Information</i>	4-18
<i>Class Attributes</i>	4-18
<i>Instance Attributes</i>	4-18
DeviceNet Object, Class 03h.....	4-19
<i>General Information</i>	4-19
<i>Class Attributes</i>	4-19
<i>Instance #1 Attributes</i>	4-20
Assembly Object, Class 04h.....	4-21
<i>General Information</i>	4-21
<i>Class Attributes</i>	4-21
<i>Instance #100 Attributes</i>	4-21
<i>Instance #101 Attributes</i>	4-21
Connection Object, Class 05h.....	4-22
<i>General Information</i>	4-22
<i>Class Attributes</i>	4-22
<i>Instance #1 Attributes (Explicit Messaging Connection)</i>	4-23
<i>Instance #2 Attributes (Polled or COS/Cyclic Consuming Connection)</i>	4-24
<i>Instance #3 Attributes (Bit-strobe Connection)</i>	4-25
<i>Instance #4 Attributes (COS/Cyclic Connection)</i>	4-26
<i>Instance #10.. #14 Attributes (Explicit Connection, UCMM Allocated)</i>	4-27
Acknowledge Handler Object, Class 2Bh.....	4-28
<i>General Information</i>	4-28
<i>Class Attributes</i>	4-28
<i>Instance Attributes</i>	4-28
Device Keeper Object, Class 8Fh.....	4-29
<i>General Information</i>	4-29
<i>Class Attributes</i>	4-29
<i>Instance Attributes</i>	4-29
Scanner Configuration Object, Class 90h.....	4-30
<i>General Information</i>	4-30
<i>Class Attributes</i>	4-30
<i>Instance Attributes</i>	4-30
Scanlist Object, Class 91h.....	4-31
<i>General Information</i>	4-31
<i>Class Attributes</i>	4-31
<i>Instance Attributes</i>	4-32

Appendix A Technical Specification

P. About This Document

P.1 How To Use This Document

This document describes network specific features and procedures needed when operating the DeviceNet Scanner Interface for the Anybus X-gateway. For general information and operating instructions for the Anybus X-gateway, consult the Anybus X-gateway User Manual.

The reader of this document is expected to be familiar with DeviceNet networking technology, and communication systems in general.

For further information, documentation etc., please visit the HMS web site, www.anybus.com.

P.2 Related Documents

Document	Author
Anybus X-gateway User Manual	HMS
Anybus-M DeviceNet Fieldbus Appendix	HMS
Common Industrial Protocol (CIP) specification	ODVA
DeviceNet Adaptation of CIP	ODVA

P.3 Document History

Revision List

Revision	Date	Author	Chapter	Description
1.00	2005-04-05	PeP	-	1st official release
1.01	2005-09-01	Pal	2	Minor update
1.10	2008-05-14	PeP	-	Major rewrite
1.11	2011-08-02	KeL	P, 2, 3	Minor updates
1.12	2012-01-23	KeL	2,3	Minor updates
2.00	May 2014	SDa	Several	New hardware & Anybus Configuration Manager

P.4 Conventions & Terminology

The following conventions are used throughout this document:

- Numbered lists provide sequential steps
- Bulleted lists provide information, not procedural steps
- The term 'X-gateway' refers to the Anybus X-gateway
- The term 'Interface' refers to the DeviceNet Scanner interface for the Anybus X-gateway.
- The term 'user manual' refers to the Anybus X-gateway User Manual.
- Hexadecimal values are written in the format NNNNh, where NNNN is the hexadecimal value.
- 16/32 bit values are generally stored in Motorola (big endian) format unless otherwise stated.

P.5 Sales and Support

For general contact information and support, please refer to the contact and support pages at www.anybus.com

1. About the DeviceNet Scanner Interface

1.1 General Information

The DeviceNet Scanner Interface for the Anybus X-gateway implements a DeviceNet scanner, and exchanges data with up to 63 DeviceNet nodes.

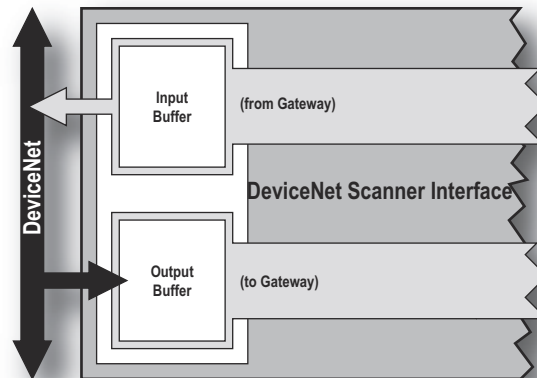
Data is exchanged through two buffers as follows:

- **Input Buffer**

This buffer holds data forwarded *from* the other network, i.e. data which can shall be sent to other DeviceNet nodes.

- **Output Buffer**

This buffer is forwarded *to* the other network, i.e. data which is retrieved from other DeviceNet nodes.



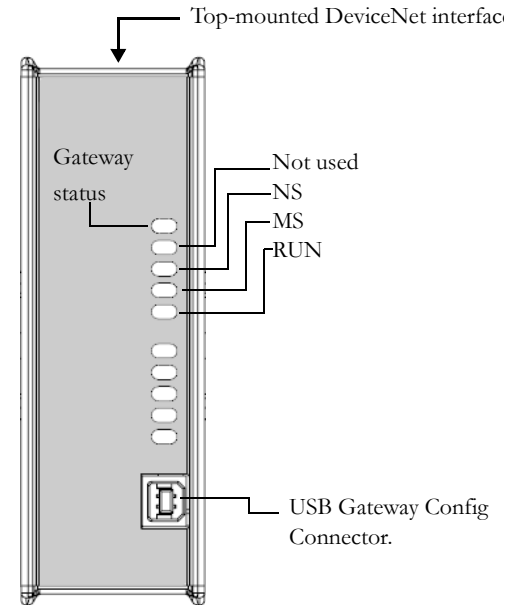
1.2 Features

- Galvanically isolated bus electronics
- 125kbit, 250kbit and 500kbit operation
- On-board configuration switches
- Up to 512 byte of I/O in each direction
- Explicit Messaging (up to 512 bytes in each direction)
- Polled I/O
- Bit-strobed I/O
- Change-of-state / Cyclic I/O

1.3 DeviceNet Status LEDs

LED	State	Indication
Gateway Status		Consult the Gateway user manual for further details.
NS	Off	No connections established
	Green	On-line, one or more connections established
	Green, flashing	On-line, no connections established
	Red	Critical link failure
MS	Off	No power
	Green	Status OK
	Green, flashing	Auto baud in progress
	Red	Major fault
RUN	Off	No power
	Green	Run mode
	Green, flashing	Idle mode

Front View



1.3.1 Connectors & Switches

DeviceNet connector

See A-34 “DeviceNet Connector Pinout”.

Configuration Switches

See 2-9 “Configuration Switches”.

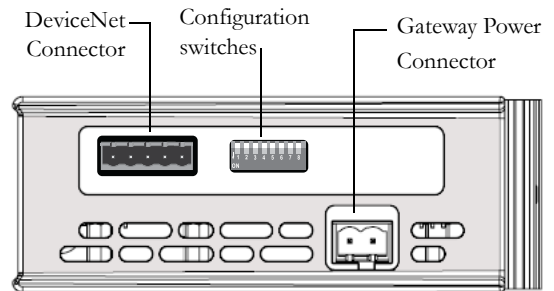
Gateway Config connector

Consult the X-Gateway User Manual for further details.

Gateway Power connector

Consult the X-Gateway User Manual for further details.

Top View



2. Installation and Configuration

2.1 Configuration Switches

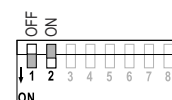
2.1.1 Baud Rate Configuration

Switches 1 and 2 are used to set the baud rate of the Scanner interface.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Switch 7	Switch 8	Baud Rate
OFF	OFF	-	-	-	-	-	-	125 k
OFF	ON	-	-	-	-	-	-	250 k
ON	OFF	-	-	-	-	-	-	500 k
ON	ON	-	-	-	-	-	-	(reserved)

Example:

In this example, the baud rate will be 250 kbit/s.



2.1.2 Mac ID Configuration

Switches 3...8 are used to set the MacID of the Scanner interface in binary format.

Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	Switch 6	Switch 7	Switch 8	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	ON	ON	63

Example:

In this example, the Scanner interface is set MacID 42.



2.2 Gateway Config Interface

The X-gateway and the DeviceNet interface may be configured by using the software tool **Anybus Configuration Manager** (ACM), which is available from www.anybus.com/support

When ACM is connected to the gateway via the USB configuration connector, the following settings are available:

Network Type	
Name	DeviceNet Master
General	
Offline option	Clear
Control word/Status word	Disable
Fieldbus Specific	
Live list	Disable
Offline Node Option	Freeze

See also...

- The Anybus X-gateway User Manual, for full details on using ACM.
- The online help in ACM, for further help on the available settings.
- 3-14 “Control & Status Word Details”
- 3-15 “Live List Interpretation”

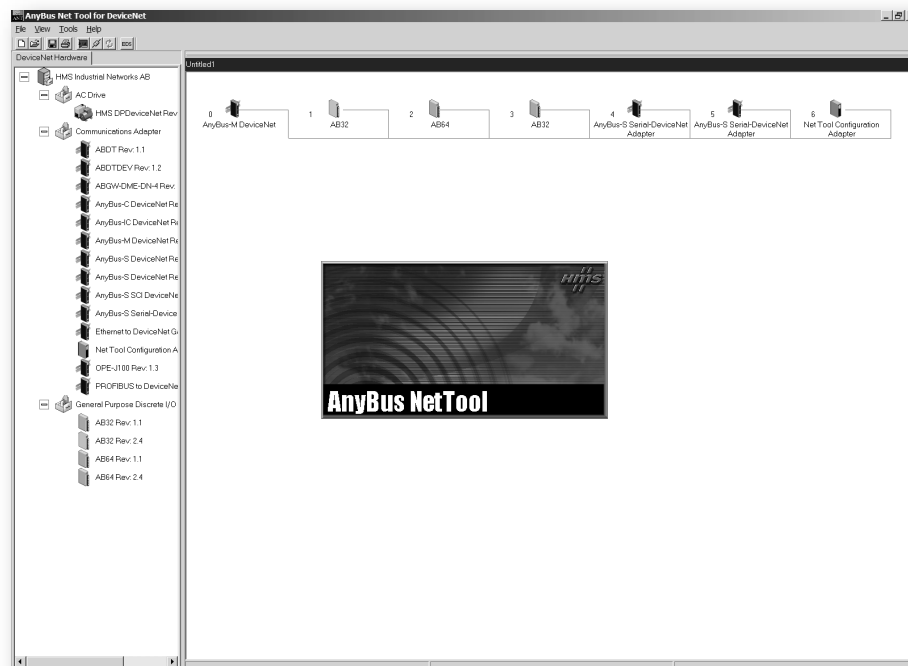
2.3 DeviceNet Scanlist Configuration

2.3.1 Anybus NetTool DN

Anybus NetTool DN is an easy to use configuration tool suitable for the Anybus-X DeviceNet Scanner interface. A fast learning curve and visual user interface allows complete network configurations to be built without spending precious time learning a new program.

Anybus NetTool DN is ordered separately, however a free trial version (limited to 2 nodes) can be downloaded from the HMS website www.anybus.com

For a configuration example, see 2-12 “Configuration Example”.



For more information, consult the Anybus-NetTool DN documentation (online help).

Configuration Drivers

To be able to configure the Scanner interface, a compatible configuration driver must be used. In the case of Anybus NetTool, the following adapters are supported:

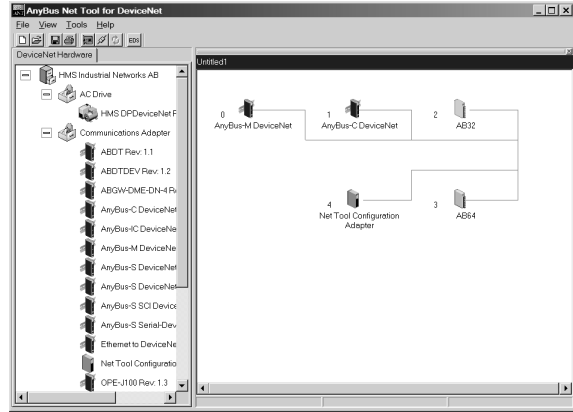
- **Anybus NetTool DeviceNet RS232 Interface (dongle)**
(Dongle ordered separately)
- **Anybus X-gateway Ethernet via Transport Provider**
(Supported if the other network connected to the X-gateway is Ethernet/IP, Modbus TCP or Profinet IO. Configuration is downloaded via the other network.)
- **Anybus X-gateway (RS232) via Transport Provider**
(Configuration is downloaded via the configuration port of the gateway.)

For further information, consult the application note “How to Configure DeviceNet with Anybus NetTool for DeviceNet”, available at www.anybus.com, or contact HMS.

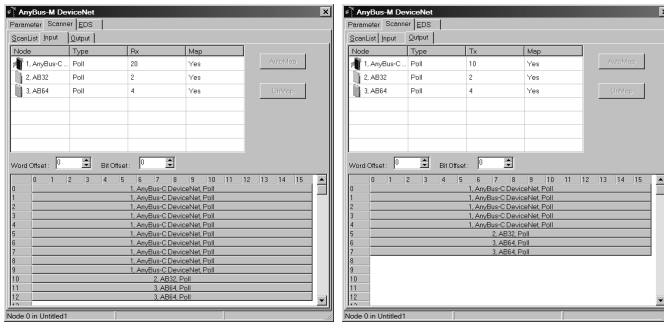
2.3.2 Configuration Example

In this example, a network consisting of 5 nodes has been created using Anybus NetTool DN.

- **Node 0 (Anybus-M)**
This is the Scanner interface itself.
- **Node 1 (Anybus-C)**
10 words input
5 words output
- **Node 2 (AB32)**
1 word input
1 word output
- **Node 3 (AB64)**
2 words input
2 words output
- **Node 4 (Anybus NetTool Configuration Adapter)**
(This node carries no data).

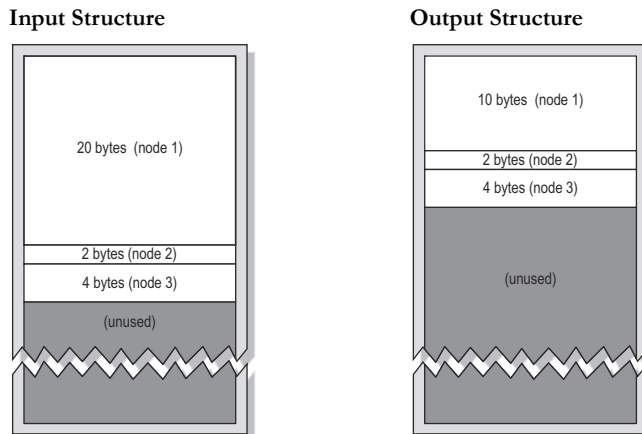


Nodes 1 - 3 are mapped to the Scanner interface as illustrated below. (Note: Although DeviceNet allows data to be mapped on a per-bit basis, this has been avoided in the example for simplicity reasons).



Node	Offset (Input)		Offset (Output)	
	Word	Bit	Word	Bit
1	0	0	0	0
2	10	0	5	0
3	11	0	6	0

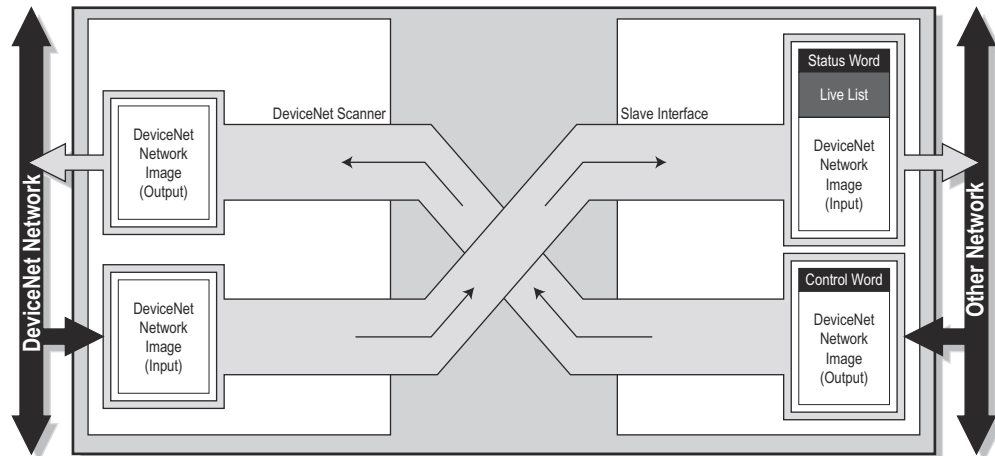
The I/O map is reflected in the Input- and Output buffers as follows:



3. Data Exchange

3.1 General Information

The Scanner Interface exchanges data with up to 63 nodes (the scanner itself occupies one node). This data (from now on referred to as DeviceNet Network I/O) is exchanged with another network as depicted below.



The structure of the DeviceNet Network I/O is determined by the configuration created in the DeviceNet configuration tool.

Note: The input/output data sizes of the Scanner Interface is determined by the size of the actual configuration created using the DeviceNet configuration tool and cannot be set via the Gateway Config interface.

See also...

- 2-10 “Gateway Config Interface”
- 2-11 “DeviceNet Scanlist Configuration”

3.2 Control & Status Word Details

3.2.1 Control Word

The Control Word, if enabled, controls the communication towards the other nodes on the DeviceNet network.

Control Word Contents:



Master Mode (bits b3 and b2):

Mode	Meaning	Comments
00b	Idle	These settings are also available from the Gateway Config interface.
01b		
10b	Run	See also... - 2-11 "DeviceNet Scanlist Configuration"
11b		

Reset (bit b7):

Reset	Meaning	Comments
0b	Normal operation	-
1b	Reset gateway	Setting this bit causes the gateway to perform a self-reset.

3.2.2 Status Word

The Status Word holds general status information as described in the generic user manual. Bit 2 and 3 indicates the Master Mode, similar to the corresponding two bits in the Control Word, see above.

(Consult the generic user manual for further information about the remaining bits in the Status Word).

IMPORTANT: *The Control- and Status Words can be disabled through the Gateway Configuration Interface. In such case, the master interface will enter 'Run' mode automatically after having completed the start up initialisation sequence. If enabled, the scanner will start up in 'Idle' mode, and will not exchange data until the mode has been changed to 'Run'.*

Depending on fieldbus, it may be necessary to swap the bytes in the Control/Status word and in the Live list.

3.3 Live List Interpretation

The Live List occupies the first 8 bytes of the input data, after the Status Word if this is enabled. It holds bit coded status information the nodes on the DeviceNet network. Each bit in the list corresponds to a Mac ID on the network, representing its status as follows:

- **Bit Set (1)**
Node configured, not faulted.
- **Bit Cleared (0)**
Node faulted (or not configured)

The highest bit in the first byte of the live list holds the status of the slave with MACID 63. The lowest bit in the eighth byte of the live list holds the status of the slave with the MACID 0. Please note that this module is itself not present in the live list.

For more information regarding the Live List, consult the generic user manual.

4. CIP Object Implementation

4.1 General Information

The DeviceNet Scanner 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

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	-
5	Get	No	Status	WORD	Device status flags
6	Get	No	Serial Number	UDINT	-
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	<u>Value:Meaning:</u> 0: Run Mode 1: Idle Mode

a. Can be customized.

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)

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	No	MAC ID	USINT	(actual MAC ID)
2	Get	No	Baud Rate	USINT	<u>Value:Meaning:</u> 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	<u>Value:Meaning</u> 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	<u>Value:Meaning</u> 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	<u>Value:Meaning</u> False Disable Quick Connect (default) True Enable Quick Connect Note: This setting is stored in non-volatile memory.
10	Get, Clear	No	Diagnostic Counters	Struct of: WORD	Diagnostic Counter Descriptor
				UINT, UINT, 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)

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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 0 Non existent 1 Configuring 3 Established 4 Timeout
2	Get	Instance type	USINT	1 (I/O Connection)
3	Get	Transport Class trigger	BYTE	<u>Value:Meaning:Type:</u> 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	<u>Value:Meaning:</u> 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	<u>Type:Value:</u> COS/Cyclic w.o. Ack. 0 Polled or COS/Cyclic with Ack. 7
14	Get	Produced Connection Path	EPATH	<u>Type:Value:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 0 Non existent 1 Configuring 3 Established 4 Timeout
2	Get	Instance type	USINT	1 (I/O Connection)
3	Get	Transport Class trigger	BYTE	<u>Value:Meaning:Type:</u> 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	<u>Value:Meaning:</u> 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	<u>Type:Value:</u> Non-acknowledged 0 Acknowledged 5
16	Get	Consumed Connection Path	EPATH	<u>Type:Value:</u> Non-acknowledged - Acknowledged 20 2B 25 01 00h
17	Get	Production Inhibit Time	UINT	0
18	Get, Set	Connection Timeout Multiplier	USINT	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 0 AutoScan Disabled (default) 1 AutoScan Enabled
17	Get, Set	Yes	AutoScan Fixed Mapping Size	USINT	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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	<u>Value:Meaning:</u> 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)
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 bytes mapped to the data table No. of bytes 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	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 bytes mapped to the data table No. of bytes 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

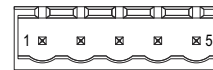
A. Technical Specification

Interface Details

- Galvanically isolated DeviceNet interface
- Supports all standard baudrates (up to 500kbit/s)
- Exchanges data with up to 63 DeviceNet nodes
- Supports Slave Mode
- Data size: Up to 256 words in, 256 words out
- Compatible with Anybus-NetTool DN (HMS)
- Compatible with RSNetWorx for DeviceNet (Rockwell)
- Configuration via Ethernet (Ethernet gateway configurations only)

DeviceNet Connector Pinout

Pin	Signal	Signal
1	V-	Negative bus power supply
2	CAN_L	CAN low
3	SHIELD	Cable shielding
4	CAN_H	CAN high
5	V+	Positive bus power supply



Note: The DeviceNet interface requires 24V bus power according to the DeviceNet standard in order to function properly.