Fieldbus Appendix

AnyBus-M AS-Interface

Rev. 1.02

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About This Manual

How To Use This Manual

This manual provides an overview of the AnyBus-M AS-I Master and is in intended to be used in cunjunction with the AnyBus-M Design Guide.

The reader of this document is expected to have basic knowledge in the AS-Interface network system, and communication systems in general.

Important user information

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

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

Related Documentation

Document name	Author
The Complete AS-Interface Specification	AS-International Association Germany
Master Profiles (Anex B to the Complete AS-Interface Specification) v2.0	AS-International Association Germany
AnyBus-S Paralllel Design Guide	HMS Industrial Networks AB

Revision list

Revision	Date	Author	Chapter	Description
1.00	2002-09-24	PeP	All	Created
1.01	2002-11-04	TTh	1	Updated LED's
1.02	2003-10-29	PeP	All	Minor corrections

Conventions used in this manual

The following conventions are used throughout this manual:

- Numbered lists provide sequential steps
- Bulleted lists provide information, not procedural steps
- The term 'module' is used when referring to the AnyBus module
- The term 'application' is used when referring to the hardware that is connected to the AnyBus Application Connector
- Hexadecimal values are written in the format NNNNh, where NNNN is the hexadecimal value.

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About the AnyBus-M AS-Interface

The AnyBus-M AS-I Master implements all functionality of the Reduced Extended Master (M2e) profile as well as some functions of the Full Extended Master(M1e) profile.

The module can manage up to 62 AS-I slaves and it complies to the AS-Interface 2.1 specification. It supports analog slaves according to slave profiles 7.3 and 7.4 (Consult the AS-Interface Slave Profiles Specification for more information), and provides data exchange using the standard AnyBus-S application interface. Additionally, the module features dedicated mailbox commands for accessing 7.4 slaves.

As for all AnyBus-M modules it is also possible to configure the network via the application interface.

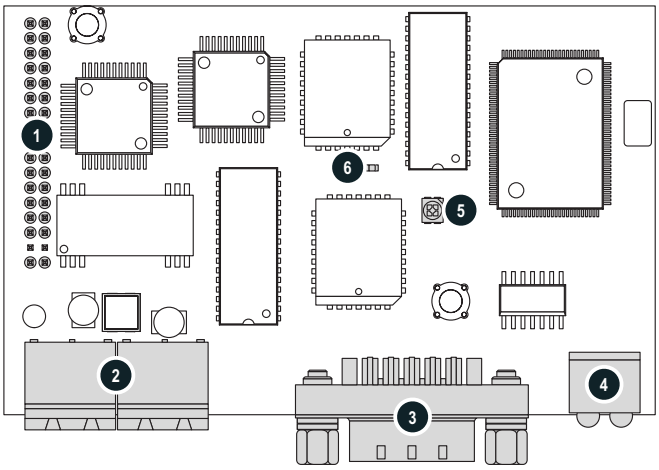
Features

- **Manage up to 62 slaves**
- **Up to 248 digital inputs and 186 digital outputs**
- **Up to 124 (16 bit) analog values**
- **Galvanically isolated bus electronics**
- **Easy to use, text based Configuration Interface via on board RS232 port**
- **Automatic Slave 0 Address Programming**
- **Complete access to network configuration via application interface**
- **Analog slave profile 7.1 and 7.2**
- **Analog slave profile 7.3 and 7.4**

Compatible Products

This product is a member of the AnyBus concept of interchangeable fieldbus modules. This makes it fully interchangeable with any fieldbus system supported by the AnyBus-M platform.

Overview



#	Description
1	Application Connector
2	Fieldbus Connectors
3	Configuration Interface
4	Status Indicators
5	AnyBus Watchdog LED
6	AS-Interface Watchdog LED

Connectors

Application Connector

The application connector features a standard AnyBus-M 2kbyte parallel DPRAM interface. For further information, please consult the general AnyBus-M Design Guide.

AS-Interface Connectors

The module supports both 5.08 pluggable screw connectors and board to board connectors.

For more information about connectors and pin assignments, see Appendix B-1 “Connectors”

Configuration Interface

This Configuration Interface provides a simple text based user interface for use with a PC. No special software is required except for a standard terminal emulatior.

For connector pinout and cable schematic, see Appendix B-1 “Connectors”

Indicators

AS-Interface Watchdog

- **Flashing**
  The AS-Interface is working properly.
- **Off**
  Module not initialised or AS-Interface network not working properly.

AnyBus Watchdog

Consult the general AnyBus-M Design Guide for further information.

Status Indicators

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

Led	State	Description
1 - Running / Idle	Green	Module is in running mode
	Red	Module is in idle mode
2 - Network Status	Off	No power or not initialised
	Flashing Green	On line according to configuration
	Green	On line, but no connections established
	Red	Offline
3 - Module Status	Off	No power or not initialised
	Flashing Green	Protected mode
	Green	Configuration mode
	Red	Power Fail bus
4 -Auto prog, slave 0 exist	Off	No error, no slave 0, autoprogramming not possible
	8Hz Green	Auto programming possible
	1Hz Green	Slave address 0 exist
	Red	Periphery error
	8Hz Red	Periphery error, auto-programming possible
	1Hz Red	Periphery error, slave with address 0 exist

Note: If the module receives the mailbox command SW_RESET (i.e a soft reset) all 4 leds will flash red 4 times.

Software Overview

Accessing the application DPRAM follows the standard AnyBus access-method. More information is found in AnyBus-S parallell design-guide.

The command interface that is used to control the module consists of the following items:

- **I/O Data Area**

  This area holds the actual network input and output data. The data can be presented in both byte and nibble mode.

- **Fieldbus Specific Area**

  This area holds general status information and information about each slave on the network.

- **Mailbox Interface**

  This interface is used for network configuration and analog slave profile 7.3/7.4 handling. Note that this interface cannot be accessed when using the serial Configuration Interface.

- **Configuration Interface (RS232)**

  This interface generally provides the same settings as the Mailbox Interface.

Initialisation Sequence

- **Send Start Init**

  (Wait for response)

- **Send AnyBus Init (In total length = 64, Out total length = 64)**

  (Wait for response)

- **Send End Init**

  (Wait for response)

- **Send Set Running / Idle Mode and Set Data Representation**

  (Wait for response)

The module is now ready to exchange data on the network.

(For more information regarding module initialisation, consult the AnyBus-M Design Guide)

Operating Modes

The module offers two modes of operation; Configuration Mode and Protected Mode. For network security reasons, some functions that are available in Configuration Mode are not available in Protected Mode and vice versa.

- **Configuration Mode**

  All slaves attached to the network are active instantly.

- **Protected Mode**

  Slaves must be detected and configured in order to become active. The mailbox command MB_SaveConfig is not allowed in this mode.

I/O Data

The I/O data from the AS-Interface network can be devided into two categories:

- Digital I/O
- Analog I/O

Digital I/O

Digital I/O data is available in the Input and Output Data areas. The data can be presented in two ways; Nibble and Byte. In Byte mode, each byte in the I/O area represents a slave on the nework, while in Nibble mode each byte holds data for two slaves.

The way data is presented can be set either using mailbox commands or via the onboard Configuration Interface.

- **Data representation in byte mode:**

  In this mode, the data for each slave is located in the lower nibble of each byte.

Offset	Slave no.							
Byte 0	0	1	2	3	4	5	6	7
Byte 8	8	9	10	11	12	13	14	15
Byte 16	16	17	18	19	20	21	22	23
Byte 24	24	25	26	27	28	29	30	31
Byte 32	-	33	34	35	36	37	38	39
Byte 40	40	41	42	43	44	45	46	47
Byte 48	48	49	50	51	52	53	54	55
Byte 56	56	57	58	59	60	61	62	63

- **Data representation in nibble mode:**

  (Even slaves = high nibble, Odd slaves = low nibble)

Offset	Slave no.							
Byte 0	1 / 0	3 / 2	5 / 4	7 / 6	9 / 8	11 / 10	13 / 12	15 / 14
Byte 8	17 / 16	19 / 18	21 / 20	23 / 22	25 / 24	27 / 26	29 / 28	31 / 30
Byte 16	33 / -	35 / 34	37 / 36	39 / 38	41 / 40	43 / 42	45 / 44	47 / 46
Byte 24	49 / 48	51 / 50	53 / 52	55 / 54	57 / 56	59 / 58	61 / 60	63 / 62

Analog I/O

- **Slave profiles 7.1 and 7.2**

  Values are read/written by the application software using I/O data directly in the input / output areas. The application has to access each slave according to the special sequence defined in the specification for analog slaves, profiles 7.1 and 7.2.

- **Slave profiles 7.3 and 7.4**

  Analog values are be read/written by the application software using dedicated mailbox commands; the number of slaves supported is 32 and starts with slave address 1 to 31.

  The application is responsible for polling the detected analog 7.3 and 7.4 profile slaves when new data is required.

Configuration Interface (RS232)

This interface provides a simple text baseed user interface via the onboard RS232 interface. All network configuration parameters are available using a standard terminal emulator such as the Windows Hyperterminal.

Note that data exchange is halted and no mailbox activity is possible while using this interface.

The interface uses the following communication settings:

Terminal emulation:	ASCII
Baudrate:	38400
Databits:	8
Stopbits:	1
Parity:	None
Flowcontrol:	None

Menu Tree Overview

	Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4
(Main Menu)	View scan-lists			
	View all nodes	Select Node	Change Param	Parameter
			Change NV Param	NV Parameter
			Change NV I/O	NV I/O
			Change NV ID	NV ID
			Change NV Ext ID1	NV Ext ID1
			Change NV Ext ID2	NV Ext ID2
			Change Node address	Node address
	View all detected nodes	Select Node	Change Param	Parameter
			Change NV Param	NV Parameter
			Change NV I/O	NV I/O
			Change NV ID	NV ID
			Change NV Ext ID1	NV Ext ID1
			Change NV Ext ID2	NV Ext ID2
			Change Node address	Node address
	View single node	Select Node	Change Param	Parameter
			Change NV Param	NV Parameter
			Change NV I/O	NV I/O
			Change NV ID	NV ID
			Change NV Ext ID1	NV Ext ID1
			Change NV Ext ID2	NV Ext ID2
			Change Node address	Node address
	Toggle Mode	Select Configuration	Configuration Mode	
		Select Protected	Protected Mode	
	Toggle online/offline	Select online	Online	
		Select offline	Offline	
	Toggle auto address enabled / disabled	Enable Auto Address	Enabled	
		Disable Auto Address	Disabled	
	Save Configuration	Configuration Saved		

Enable Terminal Interface Menu

The module displays the following screen when connecting to the Configuration Interface:

```
-------------------------------------
 Enable terminal interface menu
-------------------------------------
  Yes - Enter
-------------------------------------

  If enabling the terminal interface the
  data transfer will be disabled.
```

To activate the Configuration Interface, press <Enter>. Note that data exchange and mailbox activity will be halted until the RS232 cable is physically disconnected.

Main Menu

The following menu entries are available from the main menu. Detailed information of each menu entry is presented in the following pages.

Menu Command	Description
View scan-lists	Display AS-Interface scan lists
View all nodes	Display all slaves together with their actual configuration (Note that only detected slaves contain configuration information)
View all detected nodes	Display all detected nodes together with their actual configuration
View single node	Display the actual and permanent configuration of a specified slave
Toggle Mode	Toggle between Protected Mode and Configuration Mode
Toggle online/offline	Toggle beween online / offline status
Toggle auto address enabled / disabled	Enable / Disable automatic slave 0 addressing
Save Configuration	Store actual configuration in EEPROM and use as permanent configuration

```
-------------------------------------
 AnyBus M AS-I Main Menu
-------------------------------------
 1 - View scan-lists
 2 - View all nodes
 3 - View all detected nodes
 4 - View single node
 5 - Toggle Protected/Configuration
 6 - Toggle online/offline
 7 - Toggle auto addr. ON/OFF
 8 - Save configuration
-------------------------------------
 Offline phase active: True
 Power fail:           True
 Normal operation:     False
 Slave 0 exist:        False
 Configuration match:  False
 Periphery fault:      False
 Mode:                 Protected
 Autoprogramming:      Not possible
 Bus status:           Online
 EEPROM status:        Ok
 Auto addressing:      Enabled
```

Status

The status section reflects the contents of the AS-Interface flag bytes.

For more information about the meaning of these flags, consult the AS-Interface Specification.

View scan-lists

This command displays all network status lists in the format shown below:

```
-------------------------------------
 AnyBus M AS-I Scanlists
-------------------------------------
-------------------------------------
 Detected Nodes
  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Configured Nodes
  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
  -  -  X  -  -  -  X  -  -  X  -  -  -  -  -  -
 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Activated Nodes
  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 List of periphery faulted nodes
  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
>
```

Explanation:

- = No slave present

X = Slave present

View all nodes

This command displays I/O configuration, ID codes, and parameters for slave.

```
-------------------------------------
 AnyBus M AS-I All Nodes
-------------------------------------
  Select node to view
  Back - Esc
-------------------------------------
 Node   0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
 I/O    -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 ID     -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Param  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Node  16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
 I/O    -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 ID     -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Param  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Node  32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
 I/O    -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 ID     -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Param  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Node  48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
 I/O    -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 ID     -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
 Param  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
>
```

To alter a setting for a specific node, type the desired node address and press <Enter>.

View all detected nodes

This command will display all detected nodes.

```
-------------------------------------
 AnyBus M AS-I Detected Nodes
-------------------------------------
  Select node to view
  Back - Esc
-------------------------------------

 Node  5  9  13
 I/O   7  1  1
 ID    3  1  1
 Param -  D  D
>
```

To alter a setting for a specific node, type the desired node address and press <Enter>.

View single node

This command displays information about a single node.

```
-------------------------------------
 AnyBus M AS-I View single node
-------------------------------------
  Select node
-------------------------------------
```

To view or alter the settings for a specific node, type the desired node address and press <Enter>.

Toggle mode

This mode is used to alter the current operating mode of the module.

```
-------------------------------------
 AnyBus M AS-I Toggle mode
-------------------------------------
 1 -  Configuration
 2 -  Protected
-------------------------------------
```

Press <ESC> to cancel.

Online / Offline Mode

This command is used to toggle Online / Offline mode.

```
-------------------------------------
 AnyBus M AS-I Online/Offline mode
-------------------------------------
 1 -  Offline
 2 -  Online
-------------------------------------
```

Press <ESC> to cancel.

Auto Address

This command is used to enable / disable the automatic address programming feature.

```
-------------------------------------
 AnyBus M AS-I Auto address mode
-------------------------------------
 1 -  Auto address on
 2 -  Auto address off
-------------------------------------
```

Press <ESC> to cancel.

Save Configuration

This command stores the current configuration into non-volatile memory.

```
-------------------------------------
 AnyBus M AS-I Save configuration
-------------------------------------
  Enter to save configuration
-------------------------------------
```

Press <Enter> to store the current configuration, or press <ESC> to cancel.

Note: This command is not allowed in Protected Mode.

Alter Settings

This menu is displayed when a specific node has been selected in main menu commands 1 to 4.

```
-------------------------------------
  Select value to change
-------------------------------------
 1 - Change Parameter
 2 - Change NV Parameter
 3 - Change NV I/O
 4 - Change NV ID
 5 - Change NV Ext ID1
 6 - Change NV Ext ID2
 7 - Change Node address
-------------------------------------

 Values for node number: 45

 I/O    f       NV I/O    f
 ID     f       NV ID     f
 ID1    f       NV ID1    f
 ID2    f       NV ID2    f
 Param  f       NV Param  f
>
```

To alter the value of a parameter, select the desired parameter by typing the corresponding number and press <Enter>.

A menu similar to the one below is displayed, allowing the selected parameter to be altered. Type the new value and press <Enter>. The parameter value will change accordingly.

```
-------------------------------------
 Change Parameter
-------------------------------------
  Enter new value
  Back - Esc
-------------------------------------

 Value for node number: 45

 Old value    f
>
```

Mailbox Interface

This chapter describes the fieldbus specific mailbox commands in the module. Consult the AnyBus-S Design Guide for more information regarding mailbox functionality. Note that this interface cannot be accessed when using the serial Configuration Interface.

Fault and Status Information

When a mailbox command cannot be processed the Message Information register in the header of the response will indicate that an error occurred. Consult the AnyBus-S Design Guide for more information.

If the error code is 'Invalid Other' (Fh), extended error information is available in the Fault Information register (Extended word 8).

The fault codes in the Fault Information register are:

Register Value	Name	Description
0000h	OK	
0001h	BUSY	
0002h	WRONG_SLAVE_ADDR	
0003h	NOT_IN_LAS	
0004h	SLAVE_0_EXIST	
0005h	BUS_ERROR	
0006h	EEPROM_ERROR	
0007h	UNKNOWN	
0008h	NOT_ALLOWED	
00FEh	MODULE_IN_IDLE_MODE	
00FFh	INTERNAL_ERROR	
0100h	ERROR_UNKNOWN_COMMAND	
0200h	ERROR_WRONG_SIZE	
0400h	ERROR_TERMAL_ENABLED	

Bus Control

Set off-line / on-line mode (MB_SET_ON_LINE)

Description

This function configures the physical connection to the network, i.e on line / off line mode.

- **On line**

  The module is connected to the network and data exchange is possible. All network status lists are updated periodically.

- **Off line**

  The module is disconnected from the network. No data exchange is possible, and no status lists are updated except the configured slaves list (LPS).

Parameter	Description
Com-mand initiator	Application
Command Name	MB_SET_ON_LINE
Message type	02h
Command number	0001h
Fragmented	No
Extended Header data	-
Command data	On / Off line value. (00h=On line, 01h = Off line)
Response data	The response indicates if the command was accepted. The response data is a copy of the command data.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0001h	0001h	*MB_SET_ON_LINE*
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	On/Off line value	On/Off line value	*00h=On line, 01h=Off line*

Set Running/Idle Mode & Data Representation (MB_SET_RUNNING_IDLE)

Description

This function serves two purposes:

- **Configure Running / Idle mode**
  This function is used to enable / disable the ability to exchange data on the bus.
- **Set data representation**
  This parameter affects how I/O data is represented in memory.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_RUNNING_IDLE
Message type	02h
Command number	0004h
Fragmented	No
Extended Header data	-
Command data	Running / Idle mode value. (00h = Running, 01h = Idle) Byte / Nibble mode value. (00h = Byte, 01h = Nibble)
Response data	The response indicates if the command was accepted. The response data is a copy of the command data.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0004h	0004h	*MB_SET_RUNNING_IDLE*
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	Running / Idle Mode	Running / Idle Mode	*00h= Running, 01h = Idle*
Message data byte 2	Byte / Nibble mode	Byte / Nibble mode	*00h = Byte, 01h = Nibble*

Enable/Disable Automatic Address Programming (MB_SET_AUTO_ADDRESS)

Description

This function enables / disables the automatic slave 0 address programming feature.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_AUTO_ADDRESS
Message type	02h
Command number	0005h
Fragmented	No
Extended Header data	-
Command data	Mode value. (00h = Disable Automatic Address Programming, 01h = Enable Automatic Address Programming)
Response data	The response indicates if the command was accepted. The response data is a copy of the command data.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0005h	0005h	*MB_SET_AUTO_ADDRESS*
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	Mode	Mode	*00h=Disable, 01h=Enable*

Set Protected/Configuration Mode (MB_SET_OPERATION_MODE)

Description

This function sets the current operating mode.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_OPERATION_MODE
Message type	02h
Command number	0006h
Fragmented	No
Extended Header data	-
Command data	Operating Mode (00h = Protected Mode, 01h = Configuration Mode)
Response data	The response indicates if the command was accepted. The response data is a copy of the command data.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0006h	0006h	*MB_SET_OPERATION_MODE*
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	Mode	Mode	*00h = Protected,* *01h = Configuration*

Configuration

Set Slave Parameter (MB_SET_PARAM)

Description

This function sets the parameter value for a specified slave.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_PARAM
Message type	02h
Command number	0009h
Fragmented	No
Extended Header data	-
Command data	Slave address and Slave Parameter
Response data	The response indicates if the command was accepted. The response data is a copy of the command data.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0009h	0009h	*MB_SET_PARAM*
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	Slave Address	Slave Address	
Message data byte 2	Slave Parameter	Slave Parameter	

Set Slave Address (MB_SET_ADDRESS)

Description

This function changes the address of a specified slave.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_ADDRESS
Message type	02h
Command number	000Bh
Fragmented	No
Extended Header data	-
Command data	Old Slave Address, New Slave Address
Response data	The response indicates if the command was accepted. The response data is a copy of the command data.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	000Bh	000Bh	*MB_SET_ADDRESS*
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	Old Slave Address	Old Slave Address	
Message data byte 2	New Slave Address	New Slave Address	

Get Slave Parameter (MB_GET_PARAMETER)

Description

This function returns the parameter value of a specified slave on the network.

Parameter	Description
Command initiator	Application
Command Name	MB_GET_PARAMETER
Message type	02h
Command number	000Fh
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	Slave Address & Parameter. The response indicates if the command was accepted.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	000Fh	000Fh	*MB_GET_PARAMETER*
Data size	0001h	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	Slave Address	Slave Address	
Message data byte 2		Parameter	

Get Configuration for Slave (MB_GET_CONFIG)

Description

This function returns the configuration of a specified slave on the network.

Parameter	Description
Command initiator	Application
Command Name	MB_GET_CONFIG
Message type	02h
Command number	0011h
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the configuration data for the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0011h	0011h	*MB_GET_CONFIG*
Data size	0001h	0005h	
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	Slave Address	Slave Address	
Message data byte 2		ID Code	
Message data byte 3		I/O Config	
Message data byte 4		Ext ID1 Code	
Message data byte 5		Ext ID2 Code	

Get ID Code for Slave (MB_GET_ID)

Description

This function returns the ID Code of a specified slave on the network.

Parameter	Description
Command initiator	Application
Command Name	MB_GET_ID
Message type	02h
Command number	0016h
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the ID code the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0016h	0016h	*MB_GET_ID*
Data size	0001h	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	Slave Address	Slave Address	
Message data byte 2		ID Code	

Get I/O Configuration for Slave (MB_GET_IO)

Description

This function returns the I/O configuration of a specified slave on the network.

Parameter	Description
Command initiator	Application
Command Name	MB_GET_IO
Message type	02h
Command number	0017h
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the I/O configuration for the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0017h	0017h	*MB_GET_IO*
Data size	0001h	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	Slave Address	Slave Address	
Message data byte 2		I/O Configuration	

Get Extended ID Code 1 from Slave (MB_GET_EXT_ID1)

Description

This function returns the Extended ID Code 1 of a specified slave on the network

Parameter	Description
Command initiator	Application
Command Name	MB_GET_EXT_ID1
Message type	02h
Command number	001Dh
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the Extended ID1 Code for the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	001Dh	001Dh	*MB_GET_EXT_ID1*
Data size	0001h	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	Slave Address	Slave Address	
Message data byte 2		Ext ID1 Code	

Get Extended ID Code 2 from Slave (MB_GET_EXT_ID2)

Description

This function returns the Extended ID Code 1 of a specified slave on the network

Parameter	Description
Command initiator	Application
Command Name	MB_GET_EXT_ID2
Message type	02h
Command number	001Eh
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the Extended ID2 Code for the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	001Eh	001Eh	*MB_GET_EXT_ID2*
Data size	0001h	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	Slave Address	Slave Address	
Message data byte 2		Ext ID2 Code	

Set Extended ID1 Code for Slave 0 (MB_SET_EXT_ID1)

Description

This function configures the Extended ID Code 1 of slave 0.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_EXT_ID1
Message type	02h
Command number	0022h
Fragmented	No
Extended Header data	-
Command data	Extended ID1 code for slave 0
Response data	The response indicates if the command was accepted. The response data is a copy of the command data

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0022h	0022h	*MB_SET_EXT_ID1*
Data size	0001h	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	-	Fault information	
Message data byte 1	Extended ID1 code		

Get Parameter String from Slave (MB_GET_PARAMETER_STRING)

Description

This function returns the Parameter String of a specified slave on the network.

Note: This function is only relevant for 7.4 type slaves

Parameter	Description
Command initiator	Application
Command Name	MB_GET_PARAMETER_STRING
Message type	02h
Command number	001Fh
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the parameter string of the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	001Fh	001Fh	*MB_GET_PARAMETER_STRING*
Data size	0001h	(Depends on data 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	Slave Address	Slave Address	
Message data byte 2		String Length	*Length of parameter string in bytes*
Message data byte 3		String byte 1	
Message data byte 4		String byte 2	
...		...	
Message data byte n		String byte n	

Set Parameter String of Slave (MB_SET_PARAMETER_STRING)

Description

This function configures the Parameter String of a specified slave on the network.

Note: This function is only relevant for 7.4 type slaves.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_PARAMETER_STRING
Message type	02h
Command number	0023h
Fragmented	No
Extended Header data	-
Command data	Parameter string and slave address
Response data	The response indicates if the command was accepted.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0023h	0023h	*MB_SET_PARAMETER_STRING*
Data size	(Depends on string size)	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	-	Fault information	
Message data byte 1	Slave address		
Message data byte 2	String Length		*Length of Parameter string in bytes*
Message data byte 3	String byte 1		
Message data byte 4	String byte 2		
...	...		
Message data byte n	String byte n		

Get ID String from Slave (MB_GET_ID_STRING)

Description

This function returns the ID String of a specified slave on the network.

Note: This function is only relevant for 7.4 type slaves

Parameter	Description
Command initiator	Application
Command Name	MB_GET_ID_STRING
Message type	02h
Command number	0020h
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the ID string of the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0020h	0020h	*MB_GET_ID_STRING*
Data size	0001h	(Depends on data 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	Slave Address	Slave Address	
Message data byte 2		String Length	*Length of ID string in bytes*
Message data byte 3		String byte 1	
Message data byte 4		String byte 2	
...		...	
Message data byte n		String byte n	

Permanent Configuration

Set Permanent Slave Parameter (MB_SET_NV_PARAM)

Description

This function configures the parameter value for a specified slave and stores it in non-volatile memory.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_NV_PARAM
Message type	02h
Command number	0008h
Fragmented	No
Extended Header data	-
Command data	Slave address and Slave Parameter
Response data	The response indicates if the command was accepted. The response data is a copy of the command data.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0008h	0008h	*MB_SET_NV_PARAM*
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	Slave Address	Slave Address	
Message data byte 2	Slave Parameter	Slave Parameter	

Save Permanent Configuration for Slave in Non-Volatile Memory (MB_SET_NV_CONFIG)

Description

This function configures several settings for a specific slave and stores them in non-volatile memory.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_NV_CONFIG
Message type	02h
Command number	000Ah
Fragmented	No
Extended Header data	-
Command data	Slave Address, ID Code, I/O Configuration, Extended ID1 Code and Extended ID2 Code.
Response data	The response indicates if the command was accepted. The response data is a copy of the command data.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	000Ah	000Ah	*MB_SET_NV_CONFIG*
Data size	0005h	0005h	
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	Slave Address	Slave Address	
Message data byte 2	ID Code	ID Code	
Message data byte 3	I/O Configuration	I/O Configuration	
Message data byte 4	Extended ID1 Code	Extended ID1 Code	
Message data byte 5	Extended ID2 Code	Extended ID2 Code	

Get Permanent Slave Parameter (MB_GET_NV_PARAM)

Description

This function retreives the parameter value of a specified slave from non-volatile memory.

Parameter	Description
Command initiator	Application
Command Name	MB_GET_NV_PARAM
Message type	02h
Command number	000Eh
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	Slave Address & NV Parameter. The response indicates if the command was accepted.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	000Eh	000Eh	*MB_GET_NV_PARAM*
Data size	0001h	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	Slave Address	Slave Address	
Message data byte 2		NV Parameter	

Get Permanent Configuration for Slave (MB_GET_NV_CONFIG)

Description

This function retreives the configuration of a specified slave from non-volatile memory.

Parameter	Description
Command initiator	Application
Command Name	MB_GET_NV_CONFIG
Message type	02h
Command number	0010h
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the configuration data for the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0010h	0010h	*MB_GET_NV_CONFIG*
Data size	0001h	0005h	
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	Slave Address	Slave Address	
Message data byte 2		NV ID Code	
Message data byte 3		NV I/O Config	
Message data byte 4		NV Ext ID1 Code	
Message data byte 5		NV Ext ID2 Code	

Save Current Slave Parameters in Non-Volatile Memory (MB_SAVE_PARAM)

Description

This function stores the parameter values for all slaves in non-volatile memory.

Parameter	Description
Command initiator	Application
Command Name	MB_SAVE_PARAM
Message type	02h
Command number	0002h
Fragmented	No
Extended Header data	-
Command data	-
Response data	The response indicates if the command was accepted.

Command and response layout:

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

Save Current Slave Configuration in Non-Volatile Memory (MB_SAVE_CONFIG)

Description

This function stores the configuration for all slaves in non-volatile memory.

Note: This command is not allowed in Protected Mode.

Parameter	Description
Command initiator	Application
Command Name	MB_SAVE_CONFIG
Message type	02h
Command number	0003h
Fragmented	No
Extended Header data	-
Command data	-
Response data	The response indicates if the command was accepted.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0003h	0003h	*MB_SAVE_CONFIG*
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	-	Fault information	

Analog Data

Get Analog Input from Slave (MB_GET_ANA_INPUT)

Description

This function sets the analog values of all four channels of a type 7.3 or 7.4 type slave.

Parameter	Description
Command initiator	Application
Command Name	MB_GET_ANA_INPUT
Message type	02h
Command number	0018h
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the value of the analog channels for the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0018h	0018h	*MB_GET_ANA_INPUT*
Data size	0001h	0009h	
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	Slave Address	Slave Address	
Message data byte 2		Channel 1 (msb)	
Message data byte 3		Channel 1 (lsb)	
Message data byte 4		Channel 2 (msb)	
Message data byte 5		Channel 2 (lsb)	
Message data byte 6		Channel 3 (msb)	
Message data byte 7		Channel 3 (lsb)	
Message data byte 8		Channel 4 (msb)	
Message data byte 9		Channel 4 (lsb)	

Set Analog Output for Slave (MB_SET_ANA_OUTPUT)

Description

This function returns the analog values of all 4 channels of a 7.3 or 7.4 type slave.

Parameter	Description
Command initiator	Application
Command Name	MB_SET_ANA_OUTPUT
Message type	02h
Command number	0019h
Fragmented	No
Extended Header data	-
Command data	Slave Address 16 bit analog values for Channel 1 - 4.
Response data	The response indicates if the command was accepted.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0019h	0019h	*MB_SET_ANA_OUTPUT*
Data size	0009h	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	-	Fault information	
Message data byte 1	Slave Address		
Message data byte 2	Channel 1 (msb)		
Message data byte 3	Channel 1 (lsb)		
Message data byte 4	Channel 2 (msb)		
Message data byte 5	Channel 2 (lsb)		
Message data byte 6	Channel 3 (msb)		
Message data byte 7	Channel 3 (lsb)		
Message data byte 8	Channel 4 (msb)		
Message data byte 9	Channel 4 (lsb)		

Network Status

Get Status Lists from Network (MB_GET_LISTS)

Description

This function returns the status of all slaves on the network. Note that this information can also be retreived by reading directly out of the fieldbus specific area, see 5-1 “Fieldbus Specific Area”.

Parameter	Description
Command initiator	Application
Command Name	MB_GET_LISTS
Message type	02h
Command number	0024h
Fragmented	No
Extended Header data	-
Command data	-
Response data	The response indicates if the command was accepted. The response data contains LPS, LDS, LAS, DELTA and LPF data lists and the AS-Interface Flag bytes. Each lists consists of 64 bits, where each bit represents the status of a slave

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0024h	0024h	*MB_GET_LISTS*
Data size	0000h	0020h	
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 bytes 1-8		LPS data list	*64 bits of data*
Message data bytes 9-16		LDS data list	*64 bits of data*
Message data bytes 17-24		LAS data list	*64 bits of data*
Message data bytes 25-32		Delta data list	*64 bits of data*
Message data bytes 33-40		LPF data list	*64 bits of data*
Message data byte 41		AS-Interface flag byte 1	*(See 5-1 “Fieldbus Specific Area”)*
Message data byte 42		AS-Interface flag byte 2	*(See 5-1 “Fieldbus Specific Area”)*

Diagnostics

Get Diagnostic String from Slave (MB_GET_DIAG_STRING)

Description

This function returns the Diagnostic String from a specified slave on the network.

Note: This function is only relevant for 7.4 type slaves

Parameter	Description
Command initiator	Application
Command Name	MB_GET_DIAG_STRING
Message type	02h
Command number	0021h
Fragmented	No
Extended Header data	-
Command data	Slave Address
Response data	The response indicates if the command was accepted. The response data contains the diagnostic string of the specified slave.

Command and response layout:

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	
Command	0021h	0021h	*MB_GET_DIAG_STRING*
Data size	0001h	(Depends on string 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	Slave Address	Slave Address	
Message data byte 2		String Length	*Length of Diagnostic string in bytes*
Message data byte 3		String byte 1	
Message data byte 4		String byte 2	
...		...	
Message data byte n		String byte n	

Fieldbus Specific Area

This area provides status information from the AS-Interface network. The information is presented in the form of flags and lists that represents the status of the slaves on the network.

Memory Map

Address	Area	Description
640h - 647h	AnyBus Slave Area (8 bytes)	(Reserved for AnyBus-S compatibility)
648h - 657h	LPS (16 bytes, only bytes 0-7 used)	List of Configured Slaves
658h - 667h	LAS (16 bytes, only bytes 0-7 used)	List of Activated Slaves
668h - 677h	LDS (16 bytes, only bytes 0-7 used)	List of Detected Slaves
678h - 687h	DELTA (16 bytes, only bytes 0-7 used)	Delta List (Difference between LPS and LDS)
688h - 697h	LPF (16 bytes, only bytes 0-7 used)	List of Peripheral Faults
698h - 699h	AS-Interface Flags(2 bytes)	These flags indicates the current network status
69Ah - 6D9h	Node Status (64 bytes)	These bytes holds the status of each node
6DAh - 719h	Node I/O Configuration (64 bytes)	I/O configuration of all detected nodes
71Ah - 759h	Node ID Code (64 bytes)	ID codes of all detected nodes
75Ah - 799h	Node Parameter (64 bytes)	Parameter values for all detected nodes
79Ah	Configuration mode(1 byte)	Indicates if the Configuration Interface is active
79Bh	Running / Idle mode(1 byte)	Indicates running or idle mode
79Ch	Byte / Nibble mode(1 byte)	Indicates the current data representation mode
79Dh - 7BFh	Reserved	-

LPS - List of Configured Slaves (address 640h - 647h, Read Only)

Structure:

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

Note: Slave 32 is not a valid slave address and does not contain any information.

LAS - List of Activated Slaves (address 648h - 667h, Read Only)

Structure:

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

Note: Slave 32 is not a valid slave address and does not contain any information.

LDS - List of Detected Slaves (address 668h - 677h, Read Only)

Structure:

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

Note: Slave 32 is not a valid slave address and does not contain any information.

DELTA List (address 678h - 687h, Read Only)

This area holds the difference between the LDS and LPS lists, i.e LDS XOR LPS.

Structure:

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

Note: Slave 32 is not a valid slave address and does not contain any information.

LPF - List of Peripheral Faults (address 688h - 697h, Read Only)

Structure:

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

Note: Slave 32 is not a valid slave address and does not contain any information.

AS-Interface Status Flags (address 698h - 699h)

For more information about the meaning of these flags, consult the AS-Interface Specification.

Flag Byte 1	#Define	Meaning
Bit 0	FLAG1_OFFLINE_READY	Offline phase active
Bit 1	FLAG1_POWER_FAIL	Voltage on AS-Interface too low
Bit 2	FLAG1_NORMAL_OPERATION	Normal operation
Bit 3	FLAG1_OPERATION_MODE0	Protected mode - 1: Configuration Mode
Bit 4	FLAG1_AUTO_PROG_AVAIL	Automatic programming possible
Bit 5	(reserved)	-
Bit 6	FLAG1_LDS_0	Slave with address 0 exists
Bit 7	FLAG1_CONFIG_OK	Actual configuration matches configured configuration

Flag Byte 2	#Define	Meaning
Bit 0	FLAG2_OFFLINE	Offline mode
Bit 1	(reserved)	-
Bit 2	FLAG2_EEPROM_OK	EEPROM OK
Bit 3	FLAG2_AUTO_ADDRESS_ENABLE	Automatic addressing enabled (set by the user)
Bit 4	FLAG2_PERIPHERY_FAULT	Periphery fault
Bit 5	(reserved)	-
Bit 6	(reserved)	-
Bit 7	(reserved)	-

Node Status (address 69Ah - 6D9h)

Each byte in this area holds status information for a specific slave.

The following status codes are used.

Value	Name	Description
01h	Node Configured	Node saved in memory
02h	Node Activated	Node activated and ready to send / receive data
04h	Node Detected	Node detected on the AS-Interface network

Due to the nature of the extended addressing scheme used in AS-Interface v2.1, node number 32 does not contain any status information.

Node I/O Configuration (address 6DAh - 719h)

Each byte in this area holds the I/O configuration for a specific slave. Consult the AS-Interface specification for more information about I/O configuration codes.

Due to the nature of the extended addressing scheme used in AS-Interface v2.1, node number 32 does not contain any configuration code.

Node ID Code (address 71Ah - 759h)

Each byte in this area holds the ID Code of a specific slave.

Due to the nature of the extended addressing scheme used in AS-Interface v2.1, node number 32 has no ID code.

Node Parameter (address 75Ah - 799h)

Each byte in this area holds the permanent parameter for a specific slave. Consult the AS-Interface specification for more information about node parameters.

Due to the nature of the extended addressing scheme used in AS-Interface v2.1, node number 32 contains no parameters.

Config Mode (address 79Ah)

This byte indicates if the Configuration Interface is activate.

- **0h**
  Not Active
- **1h**
  Active

Running / Idle Mode (address 79Bh)

This byte indicates if the module is in running or idle mode.

- **0h**
  Module running, data exchange possible
- **1h**
  Module idle, no data exchange possible

Byte / Nibble Mode (address 79Ch)

This byte indicates if I/O data is represented in byte or nibble mode.

- **0h**
  Byte Mode
- **1h**
  Nibble Mode

Troubleshooting

General

Module initialized, but still unable to exchange data

- Data exchange will not take place until the module has responded to a "Set Running/Idle Mode & Data Representation" mailbox command. (See 4-3 "Set Running/Idle Mode & Data Representation (MB_SET_RUNNING_IDLE)")
- Data exchange is halted when using the Configuration Interface. Disconnect the RS232 cable when not using this interface.

I/O data seems to be on the wrong place

- The module features two modes of data representation; Byte and Nibble mode. This is configured in the "Set Running/Idle Mode & Data Representation" mailbox command. (See 4-3 "Set Running/Idle Mode & Data Representation (MB_SET_RUNNING_IDLE)")

  To read more about Byte and Nibble mode, see 2-2 "I/O Data".

Unable to use slave address 32

- Due to the nature of the extended addressing scheme used by AS-Interface v2.1, this slave address cannot be used.

  Read the AS-Interface Specification for more information.

Configuration Interface

The Configuration Interface "freezes" when trying to connect

- Flowcontrol is not supported on this interface.

  Disable flowcontrol in the terminal software.

The display is garbled up when using the Configuration Interface

- Make sure the communication settings in the terminal program conforms to the settings below:

Baudrate:	38.4kbaud
Parity:	None
Databits:	8
Stop bits:	1
Flow control:	None

Environmental Specification

Temperature

Operating

+0 to +70 degrees Celsius

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

Non Operating

-15 to +85 degrees Celsius

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

Relative Humidity

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

Test performed according to IEC 68-2-30.

EMC compliance

Emission

According to EN 50 081-2:1993

Tested per 55011:1990, class A, radiated

Immunity

According to EN 61000-6-2:1999

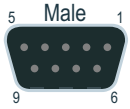
Tested per EN 61000-4-2:1995
EN 61000-4-3:1996
EN 61000-4-4:1995
EN 61000-4-5:1995
EN 61000-4-6:1996

Connectors

Configuration Interface

9-pin D-sub (Male)

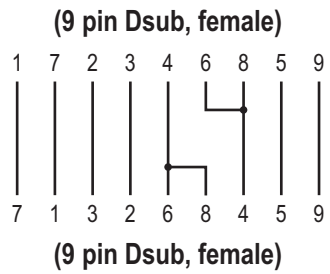
Pin	Signal
Housing	PE
1	-
2	Received Data
3	Transmitted Data
4	-
5	Signal Ground
6	Data Set Ready (Input only)
7	-
8	-
9	-



2mm Board to Board

Pin	Signal
1	PE
2	-
3	Received Data
4	Data Set Read (Input only)
5	-
6	Transmitted Data
7	-
8	-
9	-
10	Signal Ground

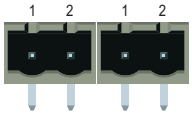
Cable Schematic



Fieldbus Interface

5.08 Pluggable Screw

Pin	Signal
1	AS-Interface +
2	AS-Interface -



2mm Board to Board

Pin	Signal
1	PE
2	-
3	AS-Interface +
4	-
5	AS-Interface -
6	-
7	-
8	-
9	-
10	-

Electrical Characteristics

Supply Voltage

Both the module electronics and the fieldbus interface requires a regulated 5V DC power supply. For more information regarding power requirements, consult the AnyBus-S Design Guide.

Power Consumption

The maximum power consumption is 200mA on the bus interface. The maximum power consumption from the application side is 450mA

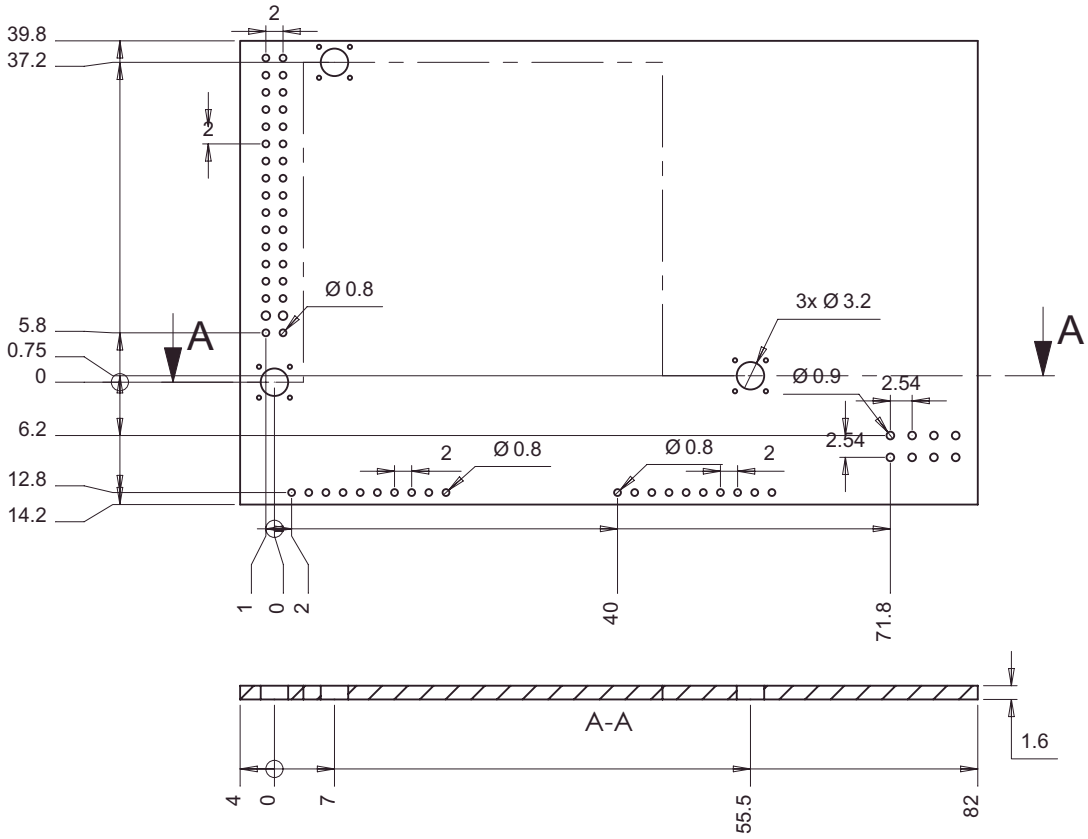
PE Grounding

A PE-connection is included on one of the mounting holes according to the AnyBus-S specification.

Mechanical Specification

Measurements, PCB

The PCB is designed to fulfil the AnyBus-S requirements.



Measurements, Connectors & Switches

Standard Configuration