

FIELD BUS APPENDIX

ANYBUS-S MODBUS PLUS

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Revision notes

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Preface

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Related Documentation

Name	Description	Document number
AnyBus-S Parallel Design Guide	Main documentation for the parallel interface version of the AnyBus-S modules	ABS-DGP-1.13
Modbus Protocol Reference Guide	Modbus Protocol Reference Guide	PI-MBUS-300 Rev. J

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1 Fieldbus Introduction

The Modbus Plus is a local area network system designed for industrial control and monitoring applications, developed by Modicon, Inc. HMS is a member of the ModConnect program for developing Modbus Plus devices.

Technical questions regarding the fieldbus should be addressed to Modicon Inc. at www.modicon.com.

The network enables programmable controllers, host computers and other devices to communicate throughout plants and substations. Modbus Plus is normally used in industrial automation, to transfer fast data for motor controllers, MMI, I/O units and other industrial equipment.

The AnyBus-S Modbus Plus module communicates according to the Modbus Plus Protocol. This means that it can communicate with all Modbus Plus nodes that comply with this protocol, but it does not necessarily mean that all services available in the Modbus Plus protocol are supported. Peer Cop is not supported.

1.1 Introduction to Modbus Plus

The media for the fieldbus is a shielded twisted pair cable. The data transfer rate is 1 Million bit/s and a data throughput of 20,000 16 bit word per second.

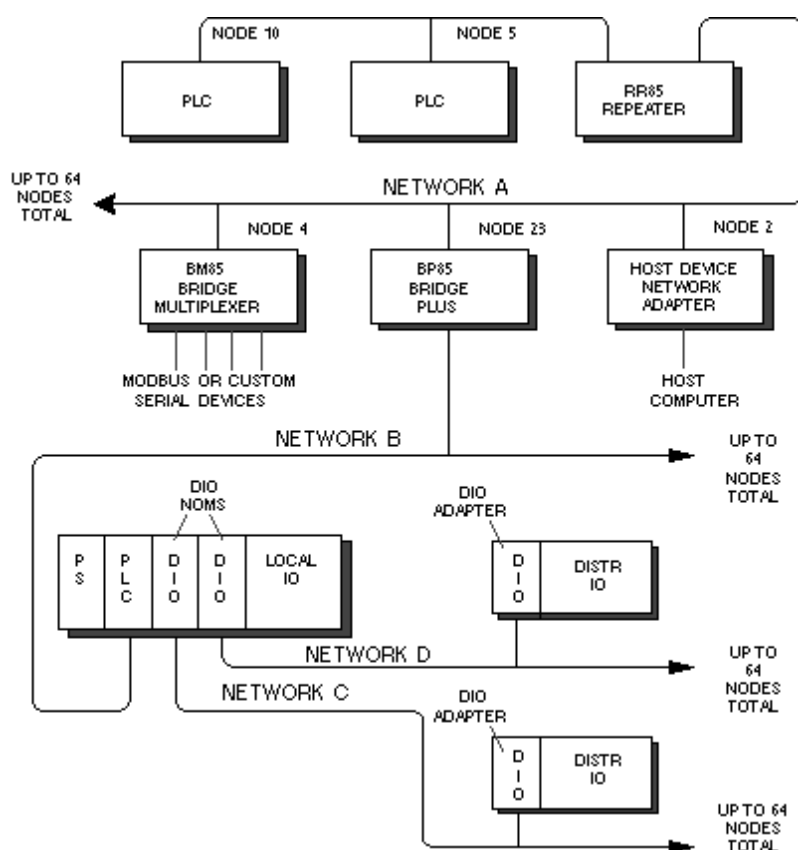


Figure 1: Modbus Plus network overview

1.2 Technical Features for Modbus Plus

Table 1: Summary technical features

Summary Technical Features Modbus Plus	
<ul style="list-style-type: none"> • Transmission Technique: RS-485 twisted pair cable (1 pair + Shield) Transmission rate 1 M bits/s • Bus length: Bus up to 2000m (with repeaters) • Max. bus cable length: Max. length of network trunk: 500m • Max amount of nodes: Nodes / Network: 32 (with repeaters 64 nodes). 	<ul style="list-style-type: none"> • Medium Access: Token bus • Two different data types: Peer-to-peer communication between network device, Modbus commands.- Global Data • Maximum number of I/O: 32 words / slave (in the same network).

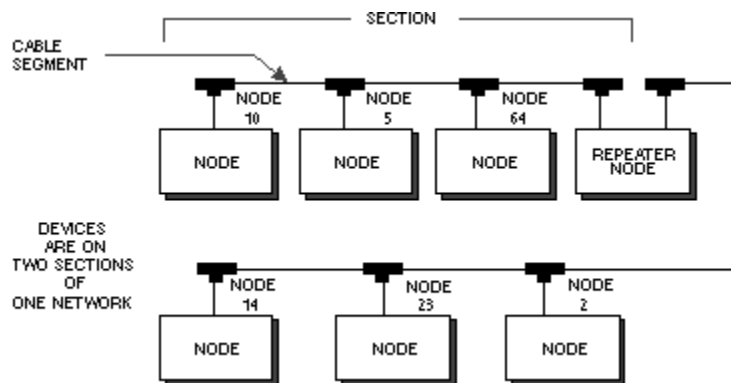


Figure 2: Nodes on a Modbus Plus network

2 Module Overview

This section provides an overview over the module and describes the technical features.

2.1 Mechanical Overview

The ANYBUS-S module for Modbus Plus is a host device. This host device can be read and written to from another Modbus Plus host device or controller. The ANYBUS-S module for Modbus Plus will not initiate any Point-to-point communication to other nodes, it will only respond to incoming commands. It can all though broadcast global data to all nodes on the network.

Via the Host connector, the ANYBUS-S is connected to the application; this gives the application an instant connection to the Modbus Plus network.

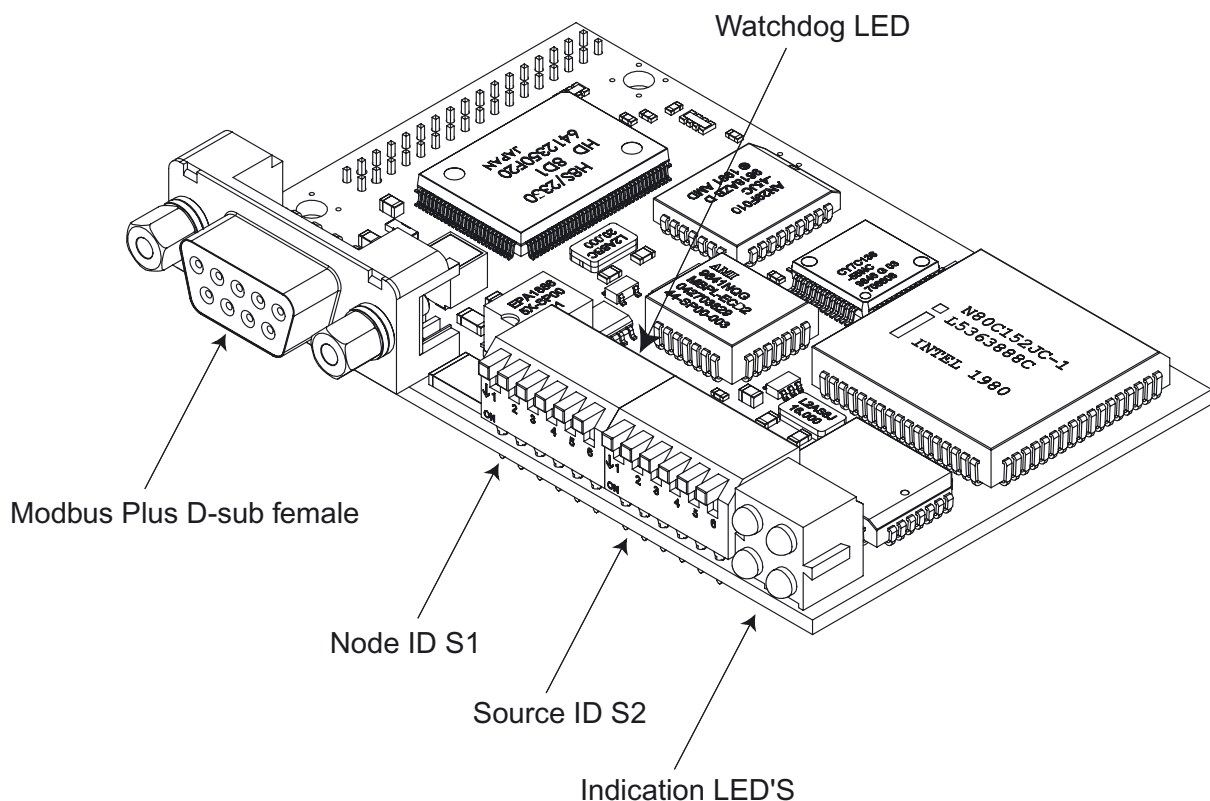


Figure 3: AnyBus-S Modbus Plus Mechanical Overview

2.2 Protocol & Supported Functions

The AnyBus-S Modbus Plus is to be used in Modbus Plus networks, in application where there is a need for exchanging large amounts of data and where the parallel application is to prefer.

The AnyBus-S Modbus Plus has two ways of exchanging data. One through fast cyclic I/O data called Global Data, and one trough a somewhat slower Modbus protocol for point-to-point parameter data transfer.

The maximum Global Data is 32 16-bit words on the bus, and with ability to set an offset within the Source node global Data. The point-to-point data transfer is handled by using one of the following Modbus functions Read holding Registers, Preset Single Register and Preset multiple Registers all 40000 registers.

2.3 Physical Interface

- Transmission media: Modbus Plus one differential line and shield.
- Topology: Token Bus Structure, virtual token ring.
- Fieldbus connectors: 9 pin female Dsub, Phoenix Contact plug-able connector or 2mm connector.
- Cable: Shielded copper cable, One Twisted pair.
- Isolation: The bus signals are separated from the other electronics with a transformer according to Modbus Plus interface description.
- ASIC's and circuits: Module is based on chip-set and software from Modicon Inc.

2.4 Fieldbus data

- Baudrate : 1MBit
- I/O data size: Maximum 32 words input and 32 words output.
- Modbus Plus Host Firmware Rev. 77.

2.4.1 Global data and Point-to-point commands

Towards the application the configuration of the in and out areas is performed in accordance with the Any-Bus-S standard. If I/O data is used it will be first in the IN and OUT area.

- Max. Amount of Global data: 32 words.
- Max. Amount of Point-to-point data / message: 125 words (Read Holding Register).

2.5 Data Exchange

- Compatibility with existing ANYBUS® modules: Only compatible with other AnyBus-S modules.
- The module supports Global Data Base Transaction

2.6 Application Interface

This section describes the access methods available from the application side between the AnyBus-S Modbus Plus module and the application.

- Parallel: Through a Dual Port RAM memory (DPRAM).
- Serial: Not supported.

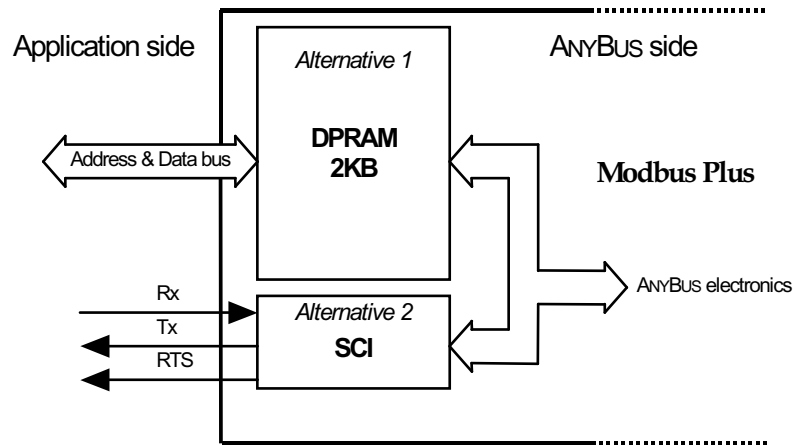


Figure 4: AnyBus-S Access methods

2.6.1 Dual-Port RAM Memory - DPRAM (Alternative 1)

The easiest way to use the AnyBus-S module is to integrate it into the system microprocessor bus. This is achieved using the parallel DPRAM interface. All relevant access and handshaking procedures are achieved through this interface. The handshake procedure is used to ensure that there will always be consistent data available on the host application side as well as on the fieldbus side. In the handshaking procedure, it will always be the host side that initiates the start of the handshaking and the AnyBus-S module will respond to it.

For more information about designing with the Parallel interface, please see the AnyBus-S Design Guide for Parallel interface.

2.6.2 Asynchronous serial interface (Alternative 2)

The serial interface is not yet available, for further information please contact HMS.

3 Installation & Configuration

3.1 Fieldbus Connectors

The table below shows the pin function of the fieldbus connectors.

3.2 D-SUB connector and Screw terminal

Table 2: D-SUB connector and screw terminal

Pin	Screw Terminal	Name
1	4	Cable Shielding
2	3	MBP Line B
3	2	MBP Line A
Housing	1	PE

3.3 10 pole 2mm connector

Table 3: 10 pole 2 mm connector

Pin	Name
1	PE
2	-
3	-
4	-
5	-
6	MBP Line A
7	-
8	-
9	MBP Line B
10	Cable Shield

3.4 Configuration

The Node ID and the Source ID switches are inverted. ON means 0 and OFF means 1. The set value is then added by one to produce the correct ID.

Example:

To set the ID to 25, set switches to 100111 (1 = ON). The two bits that are set to zero totals to $16 + 8 = 24$. Add one to produce the desired ID (25).

3.4.1 Node ID (Address) S1

The Node ID on the Modbus Plus node is set before power on. Any change of Node ID during power on is not valid until next power cycle. The address is set in binary format. The Node address is also configurable with the fieldbus specific mailbox messages, please see chapter 5.

Table 4: Switch settings for Node ID

1 MSB	2	3	4	5	6 LSB	Function
ON	ON	ON	ON	ON	ON	Node address set to 1
ON	ON	ON	ON	ON	OFF	Node address set to 2
ON	ON	ON	ON	OFF	ON	Node address set to 3
-	-	-	-			
OFF	OFF	OFF	OFF	OFF	ON	Node address set to 63
OFF	OFF	OFF	OFF	OFF	OFF	Node address set to 64

Note: The node address cannot be changed during operation.

3.4.2 Source ID (Address) S2

The AnyBus-S Modbus Plus module uses one source ID address from 1 -64 to configure what node it will extract the global data from, sent during the token pass. The amount of extracted data is set by the initialisation, which will be described later. The Source address is also configurable with the fieldbus specific mailbox messages, along with the GDB offset, please see chapter 5.

The address is set in binary format.

Table 5: Switch settings for Source ID

1 MSB	2	3	4	5	6 LSB	Function
ON	ON	ON	ON	ON	ON	Source ID address set to 1
ON	ON	ON	ON	ON	OFF	Source ID address set to 2
ON	ON	ON	ON	OFF	ON	Source ID address set to 3
-	-	-	-			
OFF	OFF	OFF	OFF	OFF	ON	Source ID address set to 63
OFF	OFF	OFF	OFF	OFF	OFF	Source ID address set to 64

Note: The source address cannot be changed during operation.

3.5 Indications

The AnyBus-S Modbus Plus module has two fieldbus specific and two standard (stacked) indication LED's mounted on the circuit board. The functionality of these LED's are described below



Table 6: LED descriptions

LED no.	Indication	Description
1	-	Not used
2	Active Red	ERROR: This led indicates that the communication is not OK.
3	Green	<p>MBP Active: This diagnostic flashes in different patterns depending on the health of the module.</p> <p>Flash every 160 ms: on 80ms, then off 80 ms. This node works normal, receiving and passing token.</p> <p>Flash every 1 s: This node is in MONITOR_OFFLINE state.</p> <p>2 flashes, on 160 ms, then off 480 ms: This node is in MAC_IDLE never-getting-token state.</p> <p>3 flashes, on 160 ms, off 240 ms and finally off 1,6 s: This node is not hearing any other nodes.</p> <p>4 flashes, on 160 ms, then off 240 ms and finally off 1,2 s: This node has detected duplicate node addresses.</p>
4	Active solid green	MBP Init: This LED indicates if the Modbus Plus interface is initialized

4 Functions & Operation

4.1 DPRAM Structure of the Modbus Plus Module

The application interface is thoroughly described in the AnyBus-S Design Guide. Many items are the same for all AnyBus-S modules. In the sections below, only the fieldbus specific items are described, i.e., items which are individual for the AnyBus-S Modbus Plus module.

4.1.1 IN/OUT Data Area

Table 7: IN/OUT data area

Area (HEX)	Contents	Access
IN area		
000h - 1FFh	Input data area ; 512 bytes	R/W
OUT area		
200h - 3FFh	Output data area; 512 Bytes	RO

The fast data area of the DPRAM is represented as global data on the Modbus Plus network. The fast data mapped to the beginning of the area. The slow data area of the DPRAM starts directly after then fast data. This data is accessed over the Modbus Plus network by using the Modbus commands for point-to-point data transfer.

The application exchanges data with the fieldbus via the DPRAM IN and OUT data areas. Before the module can be used, the length of the IN and OUT area has to be defined. This is accomplished during initialisation of the module. AnyBus-S Modbus Plus has the possibility to use both fast data and slow data. The fast global data will be assigned to I/O data. The parameter data will be the IN/OUT total length minus the cyclic I/O data, for both IN and OUT.

When using only the DPRAM memory (512 Byte):

The IN area of the AnyBus-S Modbus Plus can be configured during initialisation with a size from 0 byte to 512 bytes.

IN cyclic I/O length (7F0h-7F1h)

IN DPRAM length (7F2h-7F3h)

IN total length (7F4h-7F5h)

The OUT area of the AnyBus-S Modbus Plus can be configured during initialisation with a size from 0 byte to 512 bytes.

OUT cyclic I/O length (7F6h-7F7h)

OUT DPRAM length (7F8h-7F9h)

OUT total length (7FAh-7FBh)

If more than 512 byte IN and OUT is required, the extended IN and OUT area can be used in the AnyBus-S Modbus Plus module.

If the Extended memory is used, there can be up to 2kB IN and OUT. To set 2kB IN/OUT length, the OUT total length is set to 0x800 (2048 bytes). The extended memory is accessed using mailboxes on the parallel interface, and is mapped directly to the data area of the serial module. Please see AnyBus-S Design Guide for Parallel interface for details regarding the Initialisation.

4.1.2 Mailbox Area

Table 8: Mailbox Area

Area (HEX)	Contents	Access
	Mailbox IN area	
400h - 51Fh	Mailbox commands	R/W
	Mailbox OUT area	
520h - 63Fh	Mailbox responses	R/O

Two types of mailbox commands can be used by the AnyBus-S Modbus Plus, Standard mailbox commands, described in the AnyBus-S Design Guide, and Fieldbus Specific mailbox commands, described in chapter 5.

4.1.3 Fieldbus Specific Area

This area contains data that can be use for fieldbus specific features.

Table 9: Fieldbus Specific Area

Area (HEX)	Contents	Access
640h - 7BFh	Fieldbus Specific area	R/O

Table 10: Fieldbus Specific Area Addresses

Area (HEX)	Contents	Valid Data	Access
640h	Node ID	0x1 - 0x40	R/O
641H	Source ID	0x1 - 0x40	R/O
642H	Source Global Data Valid	0x00 No Valid Global Data 0x01 Valid Global Data	R/O
643H	Not Used	-	-
...	Not Used	-	-
7BFh	Not Used	-	-

4.1.4 Control Area

These registers contain information about the status and control environment, both for the fieldbus and the module itself, e.g. Fieldbus type, Module Software version, Module Type, configuration, etc. The following registers are specific for the AnyBus-S Modbus Plus module. For further information about the Control Area contents, please see the AnyBus-S Design Guide.

Table 11: Control Area

Area (HEX)	Contents	Access
	Control area (Fieldbus Specific parameters)	
7CCh - 7CDh	Fieldbus Type (0x0040 for Modbus Plus)	R/O
7CEh - 7CFh	Module Software Version	R/O

4.2 Initialization

Initialization of the AnyBus-S module in standard format is performed with the ANYBUS_INIT mailbox telegram, where the sizes of the input/output areas are set.

The AnyBus-S Modbus Plus module uses both I/O data and parameter data. All parameter data will be mapped after the I/O data, ("IN/OUT total lengths" minus "IN/OUT I/O data"). In the AnyBus-S Modbus Plus, I/O data is the same as global data and parameter data the same as Modbus point-to-point data commands.

The lengths specified are also checked against their maximum size. If they do not comply, the initialization will be rejected.

Note: The time between the initialization command END_INIT and the flag FBRS is set (and displayed to the application) in the register, Module Status Register (7E2h-7E3h) is 10 seconds, due to the Modbus Plus peer interface need this amount of time to be initialized.

If action towards the Modbus Plus is requested as soon the AnyBus Modbus Plus is up and running, we recommend to monitor the FBRS flag to be able to decide when the network is available for the application.

4.2.1 Initialization Example

The example below shows how to initialize the AnyBus-S Modbus Plus module with the following configuration.

- Input I/O data of 16 bytes
- Output I/O data of 16 bytes
- Input Parameter data of 20 bytes
- Output Parameter data of 20 bytes
- If the bus goes offline the outputs will freeze on the last value
- An interrupt will be generated if the bus goes online or offline
- The new data field is not activated

This is the ANYBUS_INIT telegram

Command and response layout:

Register Name	Command	Expected response	
Message ID	0x000A	0x000A	Any integer value
Message information	0x4001	0x0001	
Command	0x0002	0x0002	
Data size	0x0012	0x0012	9 words of data = 18 bytes
Frame count	0x0001	0x0001	This is frame 1
Frame number	0x0001	0x0001	One frame
Offset high	0x0000	0x0000	
Offset low	0x0000	0x0000	
Extended word 1	-	-	No message header data used
Extended word 2	-	-	"
Extended word 3	-	-	"
Extended word 4	-	-	"
Extended word 5	-	-	"
Extended word 6	-	-	"
Extended word 7	-	-	"
Extended word 8	-	-	"
Message data word 1	0x0010	0x0010	Message data
Message data word 2	0x0024	0x0024	"
Message data word 3	0x0024	0x0024	"
Message data word 4	0x0010	0x0010	"
Message data word 5	0x0024	0x0024	"
Message data word 6	0x0024	0x0024	"
Message data word 7	0x0002	0x0002	Operation mode: all data frozen in its current state when fieldbus goes offline
Message data word 8	0x0006	0x0006	Event notification when fieldbus goes online or offline
Message data word 9	0x0000	0x0000	-

Note: All access on the Modbus Plus is handled in word format (16-bit word), So initializing any module data area to an odd size is not recommended due to data consistency.

4.3 Data Exchange

The AnyBus S Modbus Plus device can be read/written from another network node. The I/O data will be updated each token rotation cycle. The Point-to-point data will be carried out over a longer time interval and is dependent on function and requested data size. The amount of data copied is determined in the configuration phase of the fieldbus initialisation. The data will be exchanged via the IN and OUT data areas of the DPRAM.

4.4 Protocol Features

The AnyBus-S Modbus Plus module can be equipped with extended fieldbus functions which will be configured with fieldbus specific mailbox commands during initialise phase and in runtime. The extended functions are: "Set GDB source", "Set Node Address", "Get Network Statistics" and "Clear Communication Counters".

Note. All access on the Modbus Plus is handled in word format (16-bit word), So initialising any module data area to an odd size is not recommended due to data consistence.

Please see chapter 5 for further information.

4.4.1 Global Data Base transaction

Each node in the Modbus Plus network is building its own Global Data Base by using the global data that passes from each node with the token pass. Each node that support global data transaction, can extract the desired source node data from the global database.

The Global Data, 1 to 32 words IN/OUT is located at the start of both the IN area and the OUT area, if the I/O size is used.

The IN and the OUT I/O data (Global Data) can be read by the point-to-point commands, while the OUT I/O data (Global Data) only can be update by the Source Node, through the Global Data.

Global Data Base function is supported in Modicon 984 PLC.

Can be accessed by using a MSTR block with the (OP Code = 5) WRITE GLOBAL DATABASE and (OP Code =6) READ GLOBAL DATABASE.

This function is supported in Modicon SA85 card.

The NetLIB functions `ncb_send_datagram()` and `ncb_receive_datagram()` can be used.

4.4.2 Point-to-point data Modbus commands supported

All the Modbus functions supported by the Anybus-S Modbus Plus is for operation on 4X registers:

- Read Holding Registers (0x03)
- Preset Single Register (0x06)
- Preset Multiple Registers (0x10)

4.5 Data map from the Network

Example:

If the module is initialised from the application with the following sizes.

- IN I/O SIZE : 64 bytes (32words)
- IN DPRAM SIZE : 200 bytes (100 words)
- IN TOTAL SIZE : 200 bytes (100 words)
- OUT I/O SIZE : 64 bytes (32words)
- OUT DPRAM SIZE : 200 bytes (100 words)
- OUT TOTAL SIZE : 200 bytes (100 words)

The data map from the fieldbus will look like this:

4.5.1 Data to network

The I/O is used, so the first area is Global Data, Max 32 words. Direct after the Global Data the parameter data follows.

The data to the link always starts at 40001 and the whole contents in the "Data to Network" area can be read with point-to-point commands (Read holding Register) and the first part of the "Data to Network" area can be read with the Global data if this is used.

Register No	"Data to Network" area
40001 GDB	
40002 GDB	
40003 GDB	Words 00001 - 00032
-	I/O Data
-	
-	
40032 GDB	
40033	
40034	
-	Words 00033 - 00100
-	Parameter-
-	Data
-	-
-	-
-	-
40100	-
	-
Not used	Internal
	Parameter Data

Example:

To read four words from the "Data to Network" parameter data area, use a Read Holding Registers with start address 40001 and No of register to read set to 4 this will give you the four first global data words.

4.5.2 Data from network

The I/O is used, so the first "Data from Network" area is for Global Data, Max 32 words. Direct after the Global Data the parameter data follows.

The "Data from Network" always starts at 41025 and the whole "Data from Network" area can be read but only the area not used for Global Data can be written by the point-to point commands.

Register No	"Data from Network" area
41025 GDB	
41026 GDB	
41027 GDB	Words 00001 - 00032
-	I/O Data
-	
41056 GDB	
41057	
41058	
-	Words 00033 - 00100
-	Parameter-
-	Data
-	
-	
-	
41124	
Not used	Internal
	Parameter Data

Example:

To write to the first two words of the "Data from Network" parameter data in the AnyBus module use Pre-set Multiple Register with the start register 41057 and No of register set to 2 words.

Note: If the OUT size is set from the application to an odd size there will be one byte that is not accessible from the fieldbus, to get the contents of the first parameter data you will need to address the next whole new word in the example below register 41058.

Example:

If the module is initialised from the application with the following sizes...

IN I/O SIZE : 64 bytes (32 words)
IN DPRAM SIZE : 200 bytes (100 words)
IN TOTAL SIZE : 200 bytes (100 words)

OUT I/O SIZE : 63 bytes (32words used on the bus)
OUT DPRAM SIZE : 200 bytes (100 words)
OUT TOTAL SIZE : 200 bytes (100 words)

...the first part of the "Data from Network" data map from the fieldbus will look like this:

Register No	"Data from Network" area
41025 GDB	
41026 GDB	
41027 GDB	Word 00001 - 00032
-	I/O Data
-	
-	
41056 GDB	Uses only high byte
41057	This word is not used
41058	
-	Word 00033 - 00100
-	Parameter-
-	Data
-	

4.6 Point-to-point exception handling

The AnyBus-S Modbus Plus module does not support all of the commands that are implemented in the peer processor. There are four different Exception Response:

Table 12: Modbus Exception Response

Code	Function
01h	Illegal function for the addressed slave
02h	Illegal data address within the information field for the addressed slave
03h	Illegal data value in the information field for the addressed slave
06h	Host side busy, reissue the command later

Exception Response Code 0x06 is not implemented in the AnyBus-S Modbus Plus module.

- If an unknown command is received from the network, this will cause the AnyBus S module to response with an Exception Response 0x01.
- If a valid command with an address out of range for the AnyBus-S memory area this will cause the AnyBus S module to response with an Exception Response 0x02.
- If the data for the commands Preset Multiple Register and Read Holding Register is invalid this will cause the AnyBus module to response with an Exception Response 0x03.

The Exception Response is two bytes, the "Function Code" and the "Exception Code".

4.7 Routing Path

When Point-to-point Modbus commands are used it is important to specify the correct Routing Path to the requested node.

Only Slave Data Paths is supported in AnyBus-S Modbus Plus module. This means that the AnyBus-S Modbus Plus module only can respond to incoming requests. These 8 Slave Data Paths is implemented as a scanning list, where path 1 is handled first and the others then in an incremented way.

To write to node 5 within the same network (no bridging to another network), the five digits Routing Path should be:

5. 2. 0. 0. 0.

5 = Node ID.

2 = Slave Data Path. 1 to 8.

Note: If the Slave Data path is not equal to 1- 8 the module will interpret this as Slave Data Path 8, this mean that you can have one extra path, routing an extra Modbus Plus network.

4.8 Modbus Functions

These functions is all 4X register functions.

4.8.1 Read Holding Registers

This function is supported in Modicon 984 PLC.

Can be accessed by using a MSTR block with the (OP Code = 2) READ DATA.

If using a SA85 card from Modicon, NetLIB functions can be used.

4.8.2 Preset Multiple Registers

This function is supported in Modicon 984 PLC.

Can be accessed by using a MSTR block with the (OP Code = 1) WRITE DATA.

This function is supported in Modicon SA85 card.

The NetLIB functions can be used.

4.8.3 Preset Single Register

This functionality is supported in Modicon 984 PLC.

Can be accessed by using a MSTR block with the (OP Code = 1) WRITE DATA.

This function is supported in Modicon SA85 card.

The NetLIB functions can be used.

5 Fieldbus Specific Mailbox Commands

PLEASE NOTE: This chapter describes the application functions supported only by the AnyBus-S Modbus Plus.

5.1 Fieldbus Specific Initialization

If the fieldbus specific parts are to be changed, the initialization mailbox command ANYBUS_INIT (See chapter 4.1) is followed by the fieldbus specific initialization commands.

The sequence is: START_INIT, ANYBUS_INIT, FIELDBUS_INIT(s), END_INIT.

PLEASE NOTE: These fieldbus specific changes are volatile until a SAVE_CONFIG is done and the LOAD_CONFIG is called in the start-up. Please see AnyBus-S Design Guide for details.

5.1.1 Alter GDB Source (SET_GDB_SOURCE)

Table 13: SET_GDB_SOURCE

Parameter	Description
Command initiator	Application INIT MODE or RUNTIME MODE
Message Name	SET_GDB_SOURCE
Message type	0x02
Command number	0x0001
Fragmented	No
Extended header data	No extended header data is associated with this command
Message data	4 Bytes. No of Sources, Source address , No of words, Offset within GDB (in words).
Response message	Contains: No of Sources, Source address, No of words, Offset within GDB .The No of Sources must always be set to 0x01.If the source is producing global data on the network this will be displayed in the Fieldbus Specific area 0x642. If the SET_GDB_SOURCE mailbox message is wrong, see error code. If error code 0x0F is displayed see Extended word 8 for details: 0x0001. I/O length miss match, larger that the init settings . 0x0002. To many source addresses.

Register Name	Command	Expected response	
Message ID	0x000A	0x000A	Any integer value
Message information	0x4002	0x0002	
Command	0x0001	0x0001	
Data size	0x0004	0x0004	4 bytes of data
Frame number	0x0001	0x0001	One frame
Frame count	0x0001	0x0001	This is frame 1
Offset high	0x0000	0x0000	
Offset low	0x0000	0x0000	
Extended word 1	-	-	No message header data used
Extended word 2	-	-	"
Extended word 3	-	-	"
Extended word 4	-	-	"
Extended word 5	-	-	"
Extended word 6	-	-	"
Extended word 7	-	-	"
Extended word 8	-	-	"
Message data word 1	0x01, 0x02	0x01, 0x02	No Of Sources 0x01; Node ID 0x02
Message data word 2	0x04, 0x02	0x04, 0x02	Words 0x04; Offset in words 0x02

Note: A byte in the FB specific area (address 0x642) will display if the Source is producing global data.

5.1.2 Alter Node Address (SET_NODE_ADDRESS)

The node address can be altered from the default DIP switch setting to an new ID value 1- 64. This message can only be set during initialisation phase.

Table 14: SET_NODE_ADDRESS

Parameter	Description
Command initiator	Application INIT MODE
Message Name	SET_NODE_ADDRESS
Message type	0x02
Command number	0x0002
Fragmented	No
Extended header data	No extended header data is associated with this command
Message data	1 Byte : the node address value. Valid data: 1 - 64.
Response message	The message data contains the requested node address valueIf the node address is valid the chosen ID will be displayed in the Fieldbus Specific area 0x640.If the SET_NODE_ADDRESS mailbox message is wrong, see error code. If error code 0x0F is displayed see Extended word 8 for details: 0x0001. Node address is out of range.

Register Name	Command	Expected response	
Message ID	0x000A	0x000A	Any integer value
Message information	0x4002	0x0002	
Command	0x0002	0x0002	
Data size	0x0001	0x0001	1 byte of data
Frame number	0x0001	0x0001	One frame
Frame count	0x0001	0x0001	This is frame 1
Offset high	0x0000	0x0000	
Offset low	0x0000	0x0000	
Extended word 1	-	-	No message header data used
Extended word 2	-	-	"
Extended word 3	-	-	"
Extended word 4	-	-	"
Extended word 5	-	-	"
Extended word 6	-	-	"
Extended word 7	-	-	"
Extended word 8	-	-	"
Message data word 1	0x04 -	0x04 -	Node Address ID = 0x04

5.1.3 Get Network Statistics (GET_NETWORK_STATISTICS)

The status of the Network is stored in the Peer Processor and this information can be accessed using the Peer Mailbox command. There are 53 words which can be accessed sending an length and offset. For a detailed description of these 53 words, see page 87 - 91 in the Modbus Protocol Reference Guide (PI-MBUS-300 Rev. J). Observe that the network statistics are only accessible when the network is up and running.

Table 15: GET_NETWORK_STATISTICS

Parameter	Description
Command initiator	Application (during RUNTIME MODE)
Message Name	GET_NETWORK_STATISTICS
Message type	0x02
Command number	0x0003
Fragmented	No
Extended header data	No extended header data is associated with this command
Command message data (two bytes)	First byte: length (in bytes). The amount of bytes to read Second byte: offset (in bytes).
Response message	The response message contains the contents of the requested bytes. If the GET_NETWORK_STATISTICS mailbox message is wrong, see error code. If error code 0x0F is displayed see Extended word 8 for details: 0x0001. Offset + Length is out of range.

Register Name	Command	Expected response	
Message ID	0x000A	0x000A	Any integer value
Message information	0x4002	0x0002	
Command	0x0003	0x0003	
Data size	0x0002	0x0006	Two bytes of data in command, six bytes of data in response
Frame number	0x0001	0x0001	One frame
Frame count	0x0001	0x0001	This is frame one
Offset high	0x0000	0x0000	
Offset low	0x0000	0x0000	
Extended word 1	-	-	No message header data used
Extended word 2	-	-	"
Extended word 3	-	-	"
Extended word 4	-	-	"
Extended word 5	-	-	"
Extended word 6	-	-	"
Extended word 7	-	-	"
Extended word 8	-	-	"
Message data words	0x06 (length, in bytes) 0x00 (offset)	The requested data (six bytes)	In this example the response contains the first three words from the available 53 words of the network statistics.

5.1.4 Clear Communications Counter (CLEAR_COMM_COUNTERS)

This mailbox command issues a clear communication error counters, word 13 to word 22 in the 53 words long network statistics map. This command can takes some time to perform, occupying the peer interface.

Table 16: CLEAR_COMM_COUNTERS

Parameter	Description
Command initiator	Application RUNTIME MODE
Message Name	CLEAR_COMM_COUNTERS
Message type	0x02
Command number	0x0004
Fragmented	No
Extended header data	No extended header data is associated with this command
Message data	No data is associated with this command.
Response message	No data is associated with this command. If the CLEAR_COMM_COUNTERS mailbox message is wrong, see error code.

Register Name	Command	Expected response	
Message ID	0x000A	0x000A	Any integer value
Message information	0x4002	0x0002	
Command	0x0004	0x0004	
Data size	0x0000	0x0000	0 byte of data
Frame number	0x0001	0x0001	One frame
Frame count	0x0001	0x0001	This is frame 1
Offset high	0x0000	0x0000	
Offset low	0x0000	0x0000	
Extended word 1	-	-	No message header data used
Extended word 2	-	-	"
Extended word 3	-	-	"
Extended word 4	-	-	"
Extended word 5	-	-	"
Extended word 6	-	-	"
Extended word 7	-	-	"
Extended word 8	-	-	"
Message data word 1	-	-	"

6 Electrical specification

The table below describes the general pin configuration for the Application interface.:

Table 17: Electrical pin specification

Contact Pin	Description	Symbol	Min	Typ	Max	Unit
1	+5V BUS Bus Electronics	V_{CC} I_{IN}	4.75 -	5.0 85	5.25 95	V mA
2	GNDBUS Ground					
3-4	No connection					
5	+5V Power Electronic	V_{CC} I_{IN}	4.75 -	5.0 90	5.25 100	V mA
6	GND Ground					
7-31 33-34	Depending on interface, please see tables below.					
32	RES IN Reset (Pulse duration)	V_{IH} V_{IL} t_w	0.7 V_{CC}		0.3 V_{CC}	V V μS

Table 18: Alternative 1 - Interface with DP-RAM

Parallel Pin	Description
7-8	Not used (asynchronous data)
9-18	Address pins
19-26	Data pins
27	BUSY
28	IRQ
29	RD
30	WR
31	CE
33	Address pin
34	Not connected

Table 19: Alternative 2 - Asynchronous Serial Interface

SCI Pin	Description
7	Tx
8	Rx
9 - 12	Not Connected
13	RTS
14 - 31	Not Connected
31 - 34	Not Connected

For further information regarding timing and electrical characteristics of the DPRAM, please see Cypress Data Book, type CY7C136.

7 Module mechanics

This chapter includes drawings of the module for overview and mechanical design. The drawings describe the standard configuration of the AnyBus-S Modbus Plus module. The fieldbus interface can be either side or top mounted. Reverse mounting is not allowed on the 9 pin D-sub connector.

Connectors that are supported by the AnyBus-S Modbus Plus module are:

- 9 pin female D-SUB
- Pcrew terminal 3.81 mm
- Pluggable screw terminal 3.81 mm
- 10 pole 2.0 mm

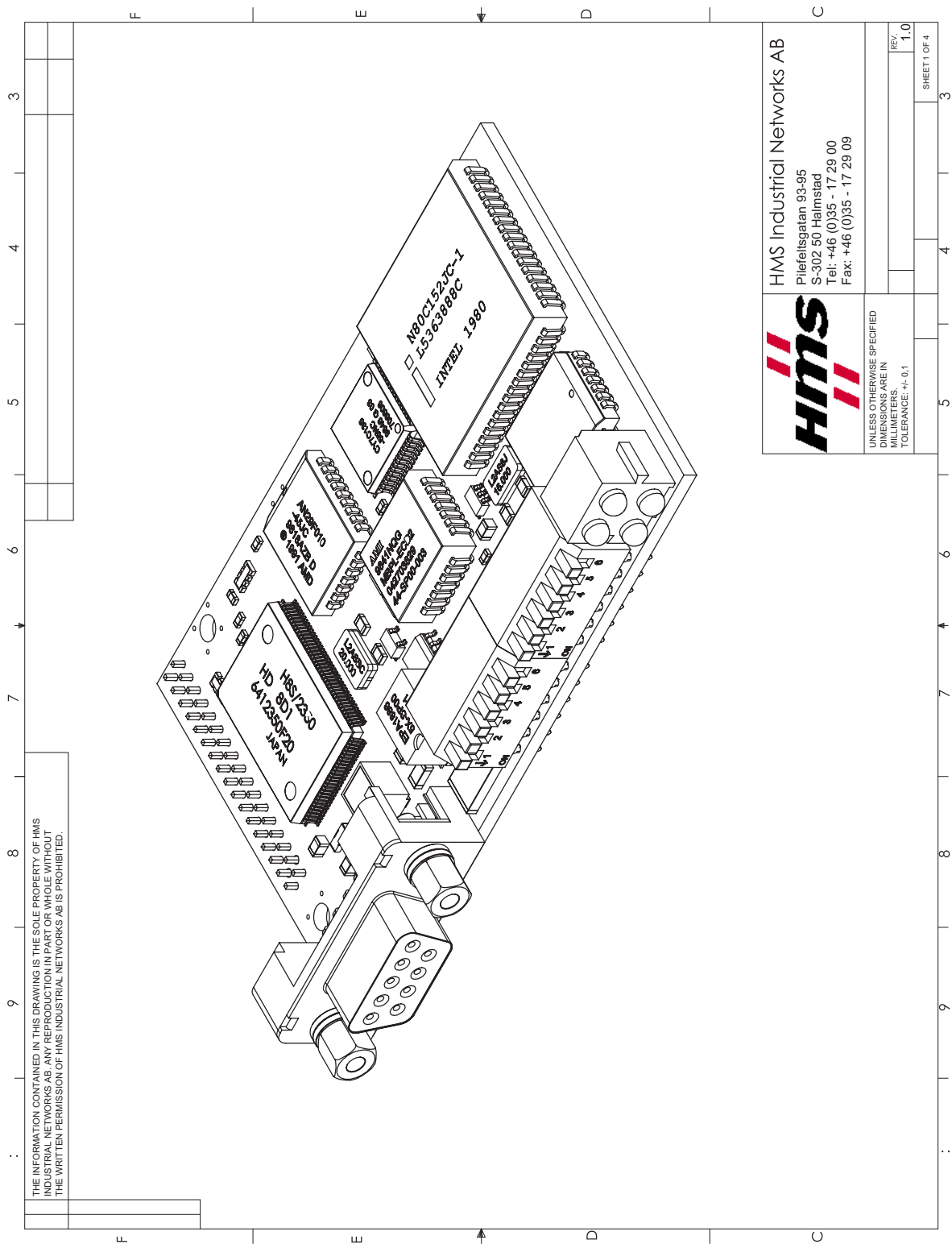
For further information regarding the AnyBus-S module, we refer to the AnyBus-S Design Guide.

Note: The AnyBus S Modbus Plus is only supporting the AnyBus S PE hole configuration.

7.1 Mechanical drawings in this manual

These drawings are contained in this section:

- AnyBus-S Modbus Plus Angled 3-D view
- AnyBus-S Modbus Plus Angled Top view
- AnyBus-S Modbus Plus Angled Front and Side view
- AnyBus-S Modbus Plus Angled PCB view
- AnyBus-S Modbus Plus Straight 3-D view
- AnyBus-S Modbus Plus Straight Top view
- AnyBus-S Modbus Plus Straight Front and Side view
- AnyBus-S Modbus Plus Straight PCB view



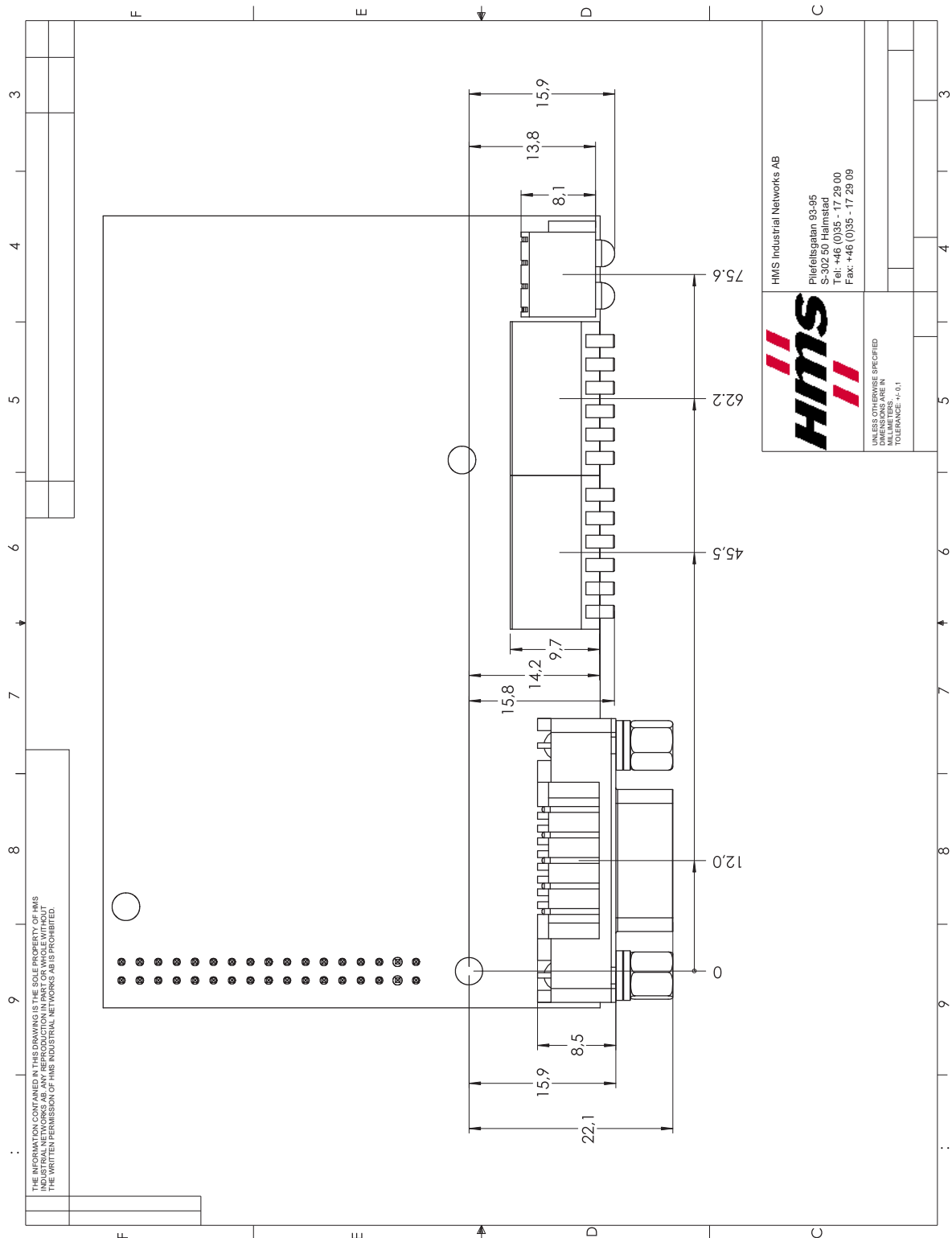


Figure 6: AnyBus-S Modbus Plus Angled Top view

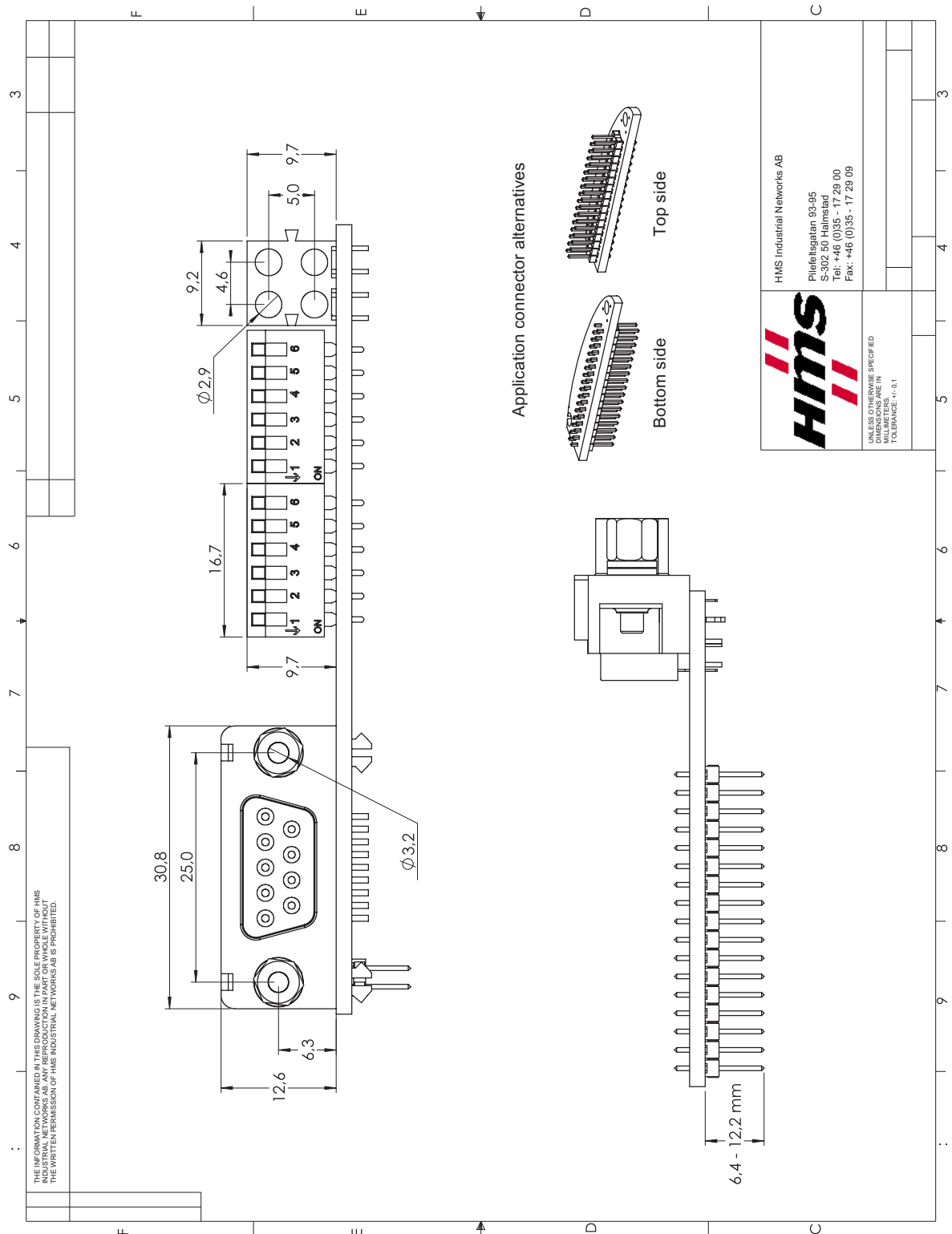


Figure 7: AnyBus-S Modbus Plus Angled Front and Side view

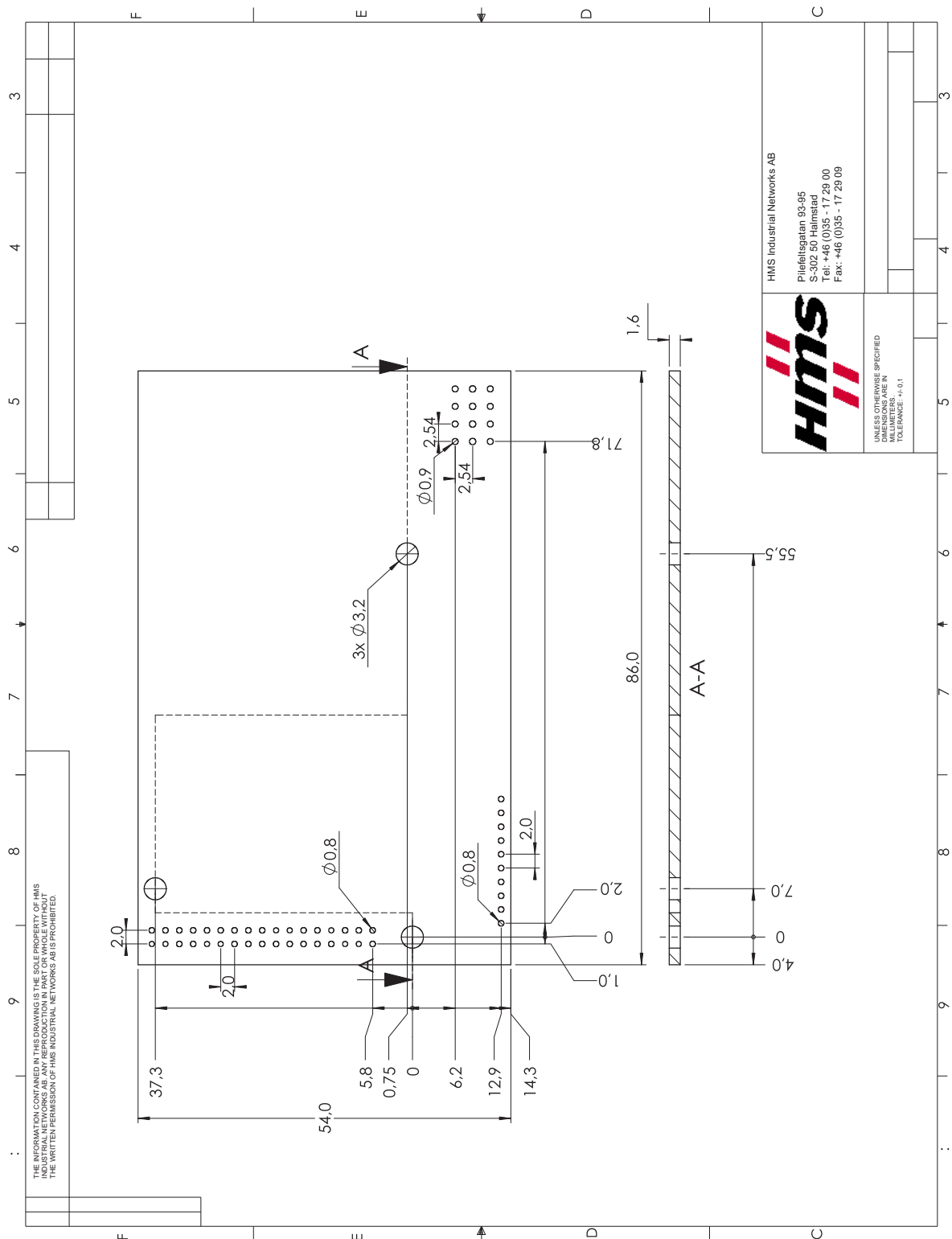


Figure 8: AnyBus-S Modbus Plus Angled PCB view

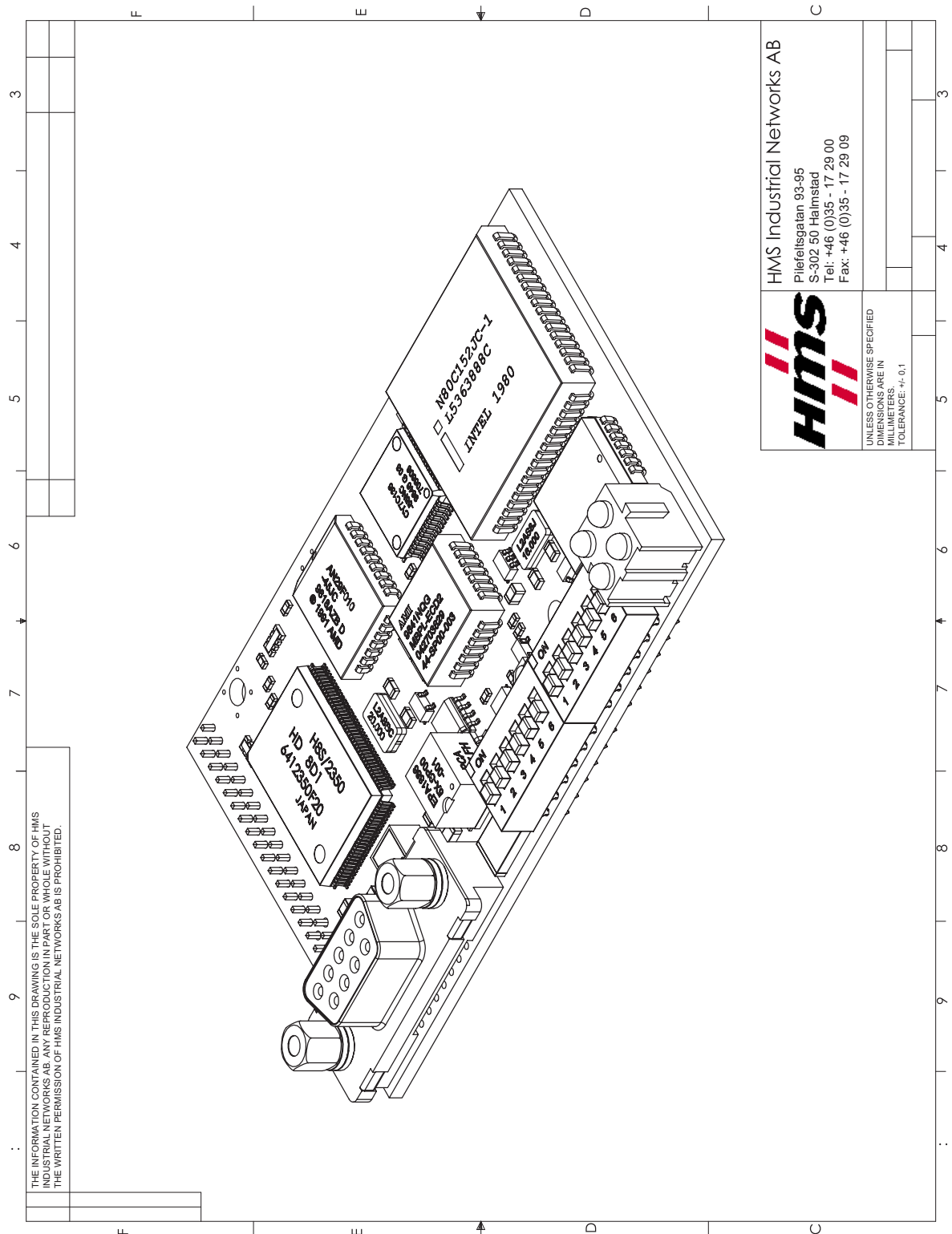


Figure 9: AnyBus-S Modbus Plus Straight 3-D view

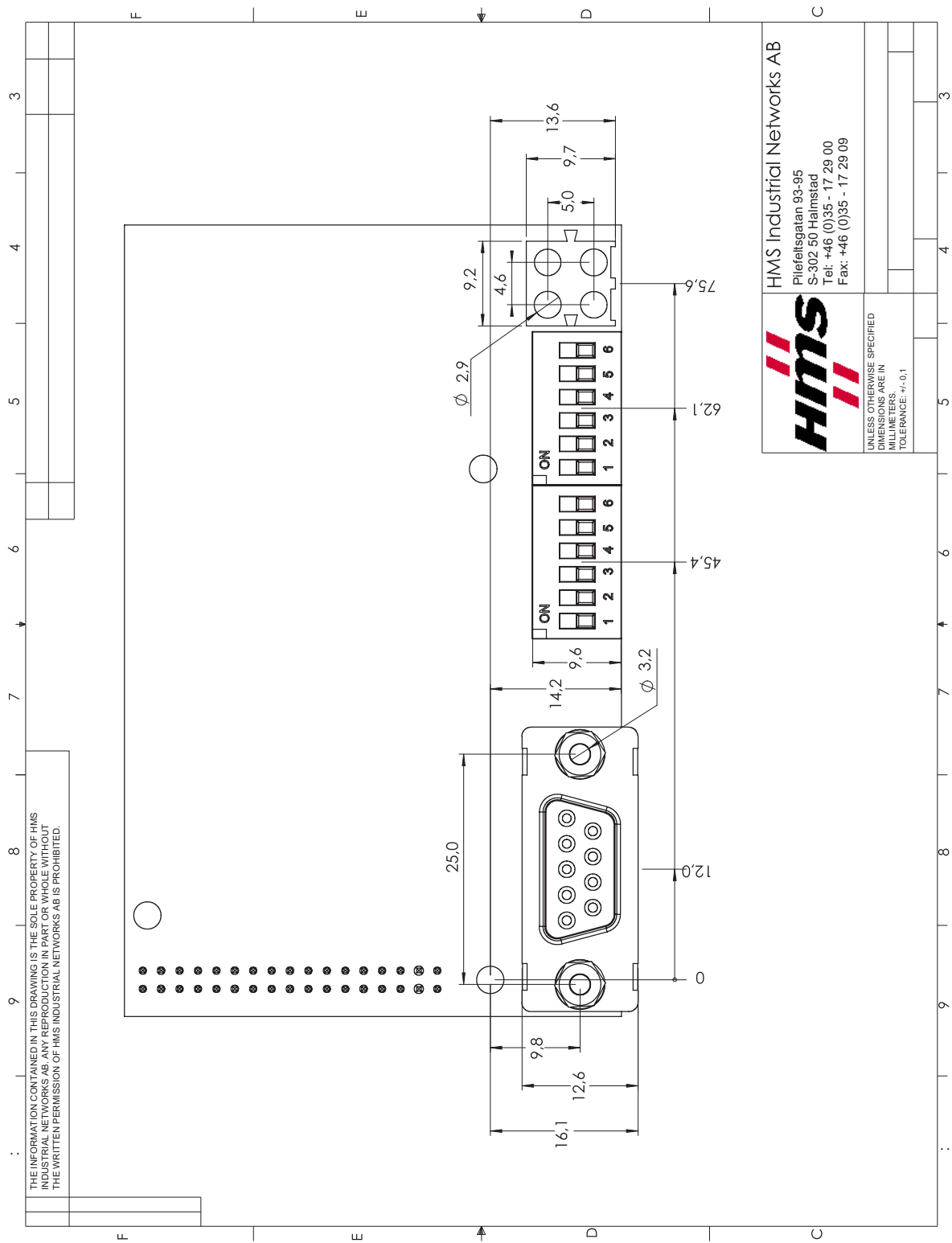


Figure 10: AnyBus-S Modbus Plus Straight Top view

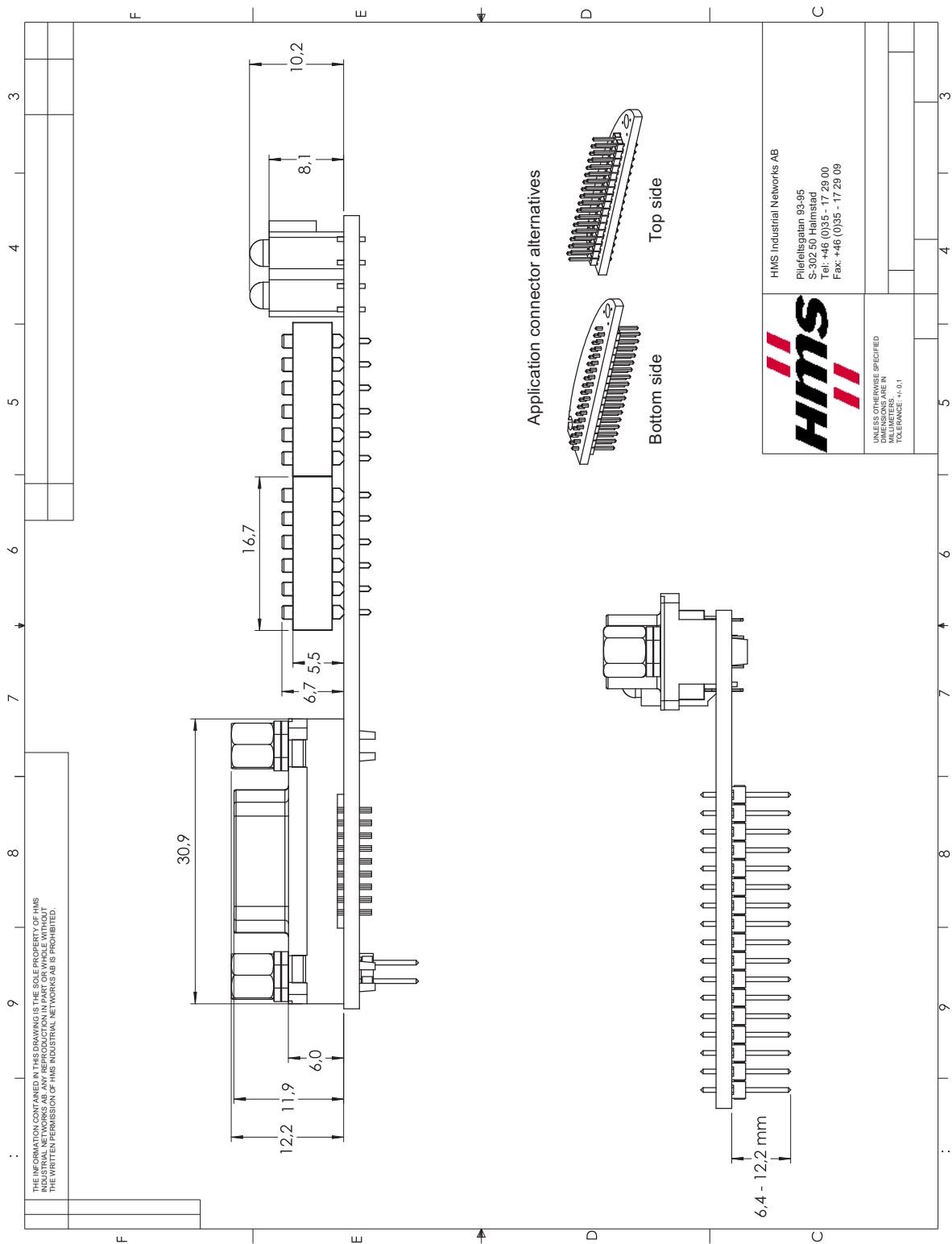


Figure 11: AnyBus-S Modbus Plus Straight Front and Side view

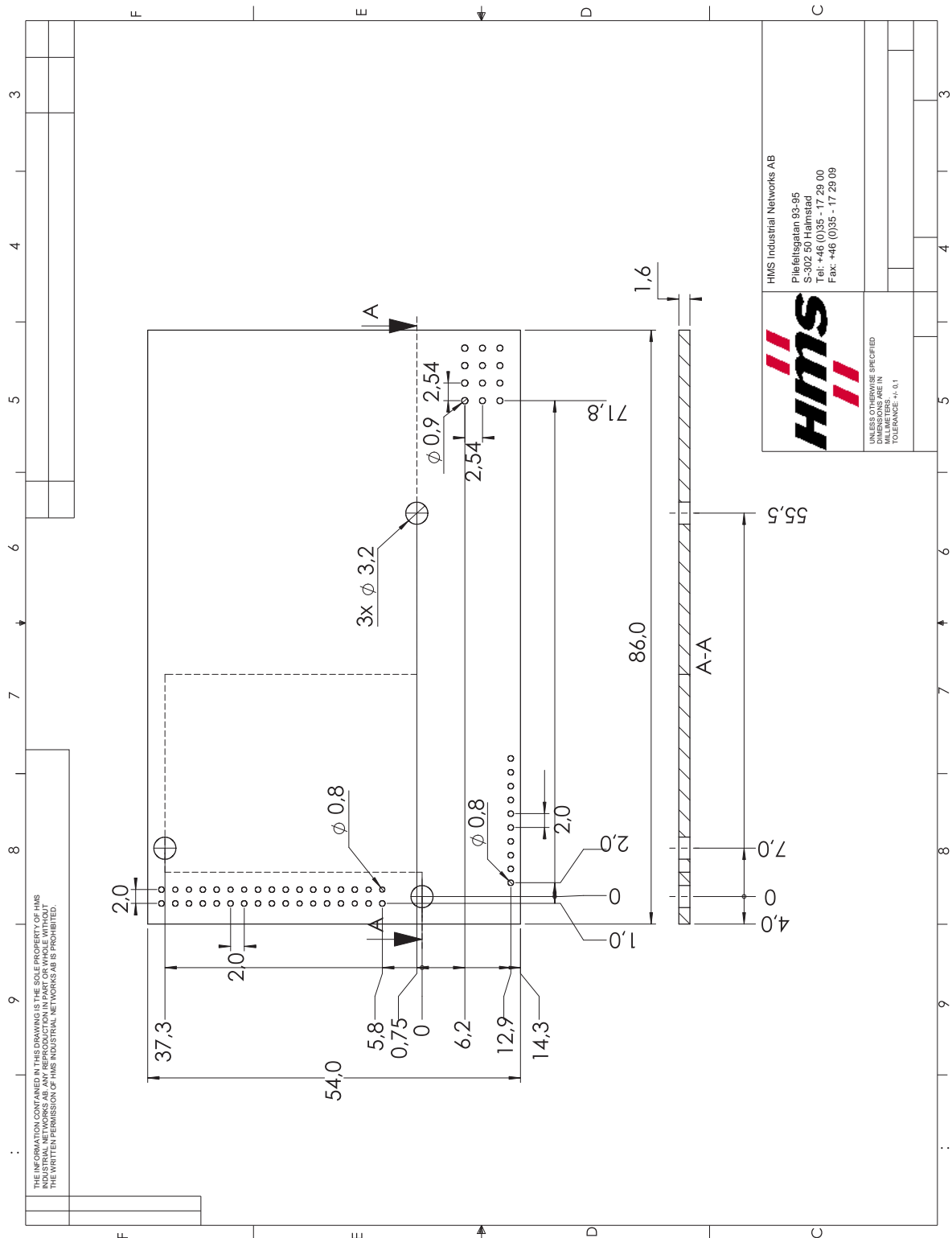


Figure 12: AnyBus-S Modbus Plus Straight PCB view