

Network Interface Appendix

Anybus[®]-S CC-Link IE Field Network

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Important User Information

This document is intended to provide a good understanding of the functionality offered by CC-Link IE. The document only describes the features that are specific to the Anybus-S CC-Link IE. For general information regarding the Anybus-S, consult the Anybus-S design guides.

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

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

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P. About This Document

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

P.1 Related Documents

Document	Author
Anybus-S Parallel Design Guide	HMS
CC-Link IE Field Network Compatible Product Reference Manual (Communication LSI CP220)	Mitsubishi Electric Open Field Network
CC-Link Fieldbus Specification	CLPA

P.2 Document History

Summary of Recent Changes (1.03 ... 1.10)

Change	Page(s)
Added transient server capabilities to features	3
Added section on transient server capabilities	7
Corrected table for switch 8	5
Corrected I/O block size for bits	8

Revision List

Revision	Date	Author(s)	Chapter(s)	Description
1.00	2011-02-02	KeL	-	First official release
1.01	2011-02-08	KeL	3	Minor corrections
1.02	2011-05-06	KeL	P, 2	Minor updates
1.03	2014-02-15	KeL	2	Minor corrections
1.10	2014-02-28	KeL	1,2	Added info on transient server capabilities, minor corrections

P.3 Conventions & Terminology

The following conventions are used throughout this manual:

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

P.4 Support

For general contact information and where to find support, please refer to the contact and support pages at www.hms-networks.com.

1. About the Anybus-S CC-Link IE

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-S platform.

The Anybus-S CC-Link IE module is a slave module for the CC-Link IE Field Network. It contains the functionality needed to turn an application into a CC-Link IE intelligent device station, and it can be customized to appear as a vendor specific CC-link IE implementation rather than a generic Anybus-S module.

CC-Link IE is released in different versions depending on the network structure. The CC-Link IE Controller Network is used to aggregate each field/motion network. The CC-Link IE Field Network is used for collecting manufacturing information, maintaining data and for diagnostic data. The Anybus-S CC-Link IE only supports the Anybus-S CC-Link IE Field Network

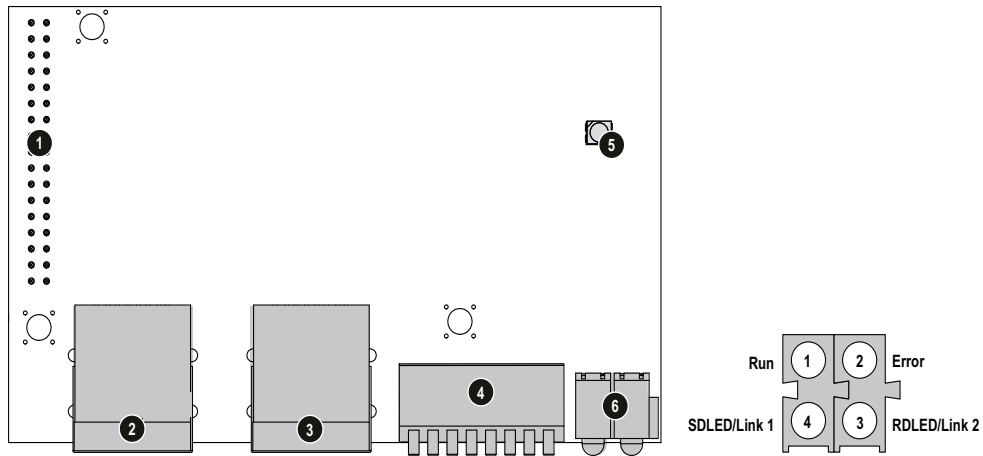
1.1 Features

- CC-Link IE Field Network intelligent device station
- Up to 512 bytes of I/O data, distributed between bit and word data as desired.
- Up to 1536 bytes of parameter data
- Baud rate 1 Gbps fixed
- Transient server capabilities
- Possibility to customize Vendor Code, Model Code and Version via application interface
- Station Number configuration via switches or application interface

1.2 Important Information

- EMC pre-compliance testing has been conducted according to the Electromagnetic Compatibility Directive 2004/108/EC. For more information see “EMC (CE) Pre-compliance” on page 37.
- The power consumption of this module is relatively high, up to 600 mA, see “Power consumption” on page 38.

1.3 Overview



#	Description	
1	Application connector	Consult the general Anybus Parallel Design Guide for further information
2	Ethernet connector, port 1	See "Ethernet connector" on page 35
3	Ethernet connector, port 2	
4	Configuration Switches	For more information see "Configuration Switches" on page 5
5	Anybus watchdog LED	Consult the general Anybus Parallel Design Guide for further information
6	Network status LEDs	These LEDs indicate run time status and errors to the user, see "Network Status LEDs" on page 5.

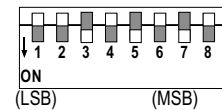
Network Status LEDs

#	Indication	State	Description
1	Run	Off	- No power - No network detected - Network timeout
		Green	Normal operation
2	Error	Off	- Normal operation - No power
		Red	- Station not operating normally - Duplicate station number - Master parameter error - Illegal station address during initialization
		Blinking red	Link error
3	RDLED	Off	- No data received - No power
		Green	Data received
	Link 2	Off	- No data link - No power
		Green	Link is established to an Ethernet network
4	SDLED	Off	- No data transmission - No power
		Green	Data transmission
	Link 1	Off	- No data link - No power
		Green	Link is established to an Ethernet network

Configuration Switches

Switches 1 to 7 are used to set the module node number before startup of the module. Any changes will take effect after a restart.

Switch Setting (1 - 7)	Description
0	Reserved. The ERROR LED indicates solid red.
1 - 120	Node number setting. Switch 1 is LSB and switch 7 is MSB.
(121 - 126)	Invalid Node numbers. No network communication, and the ERROR LED indicates solid red.
127	Node number is assigned from mailbox message if available, else ERROR LED indicates solid red.



Switch 8 is used to decide what indications to show on LED 3 and LED 4, either data transmission information (RD/SD) or link information (Link 1 and Link 2).

Switch Setting (8)	Description
ON	LINK status indication on LED 3 and LED 4
OFF	RD/SD status information on LED 3 and LED 4 (Default)

Switch 8 can be changed at any time, and the change will take immediate effect.

2. Basic Operation

2.1 General

2.1.1 Modes of operation

The Anybus-S CC-Link IE offers two modes of operation:

- **Generic Anybus-S mode**

No special initialization settings are needed to run in this mode, and the module will operate with the following properties:

- CC-Link IE Field Network Intelligent station
- Vendor code: 0212h (HMS Industrial Networks)
- Device type: 7Fh (Generic Device):
- Node number: - (set by onboard switches)
- Baud rate: 1 Gbps
- Max. I/O Data Size (points): 832 (determined by ANYBUS_INIT)
- Max. I/O Data Size (words): 204 (determined by ANYBUS_INIT)

- **Fieldbus specific mode**

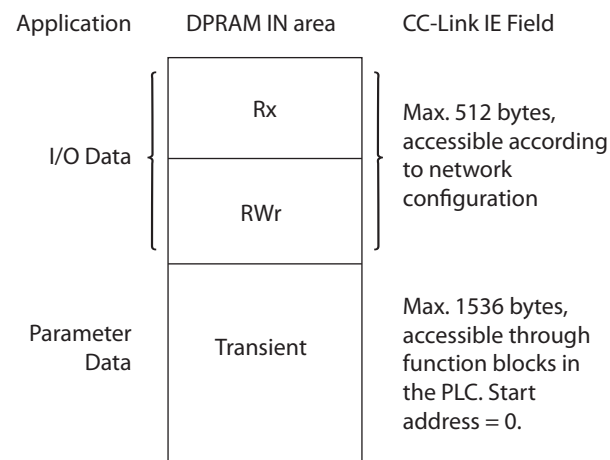
This mode requires additional mailbox messages to be issued during initialization, which enables the module to operate as follows:

- CC-Link IE Field Network Intelligent station
- Vendor code: - (Specified in SET_DEVICE_IDENTITY)
- Device type: - (Specified in SET_DEVICE_IDENTITY)
- Node number: - (set by onboard switches)
- Baud rate: 1 Gbps
- Max. I/O Data Size (points): 512 bytes¹ (4096 points, determined by FB_INIT)
- Max. I/O Data Size (words): 512 bytes¹ (256 words, determined by FB_INIT)
- Max Parameter Data Size: 1536 bytes (768 words)

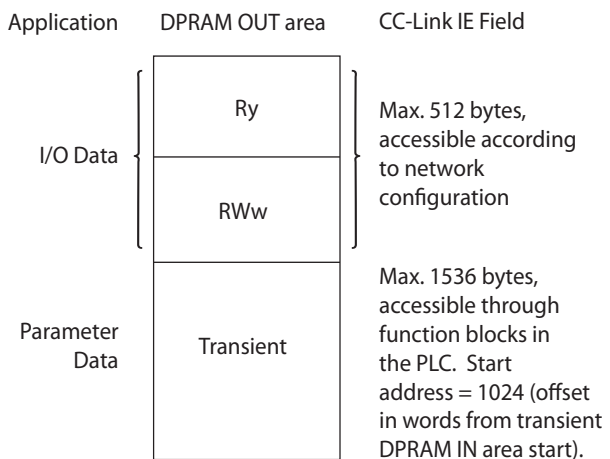
1. Point (bit) + word data ≤ 512 bytes

2.2 Data exchange

I/O data and parameter data can be exchanged between the application and the module. The I/O data is transferred as cyclic data (RWx, Ry and Rx points) and the parameter data (transient communication data points) as acyclic. When accessing the transient area from the CC-Link IE Field network side, it will start with address 0.



Please note, that when accessing the transient area in the DPRAM OUT area from the CC-Link IE Field network, all read and write requests must have a 1024 (word) address offset from the transient DPRAM IN area.



Data Access from the Network

The Anybus-S CC-Link IE supports server functionality for transient transmission. The available transient data services capabilities are:

- Read service G.RIRD¹ for access to the transient IN area
- Read service G.RIRD¹ and and Write service G.RIWT¹ for access to the transient OUT area

The module support the commands “Read memory (10h)” and “Write memory (12h)” that are used by the master in these services. In the commands, the access code has to be specified to “Data Register” (04h).²

Please note the offset (1024 words) for the write requests.

1. For more information about the function blocks G.RIRD (Reading Data form the Target Station) and G.RIWT (Writing Data in Target Station), please consult the CC-Link IE Field Network Master manual.
2. This is the only access code supported by the module.

2.2.1 General Anybus-S mode

Data representation

The cyclic data (the I/O data) on the Anybus-S CC-Link IE Field Network is divided in bit and word information. To be able to predict the distribution of data, the I/O size is divided in one part including 16 bit blocks of bit information and a second part with 64 bit blocks of word information. When the total size is set by the Anybus (after an Anybus INIT), this will give the following distributions:

I/O size (bytes)	Bit data (bytes)	Word data (bytes)	CC-Link points, Bit/Word
0 < Size ≤ 2	Size	0	16/4
2 < Size ≤ 10	2	Size-2	16/4
10 < Size ≤ 12	4	Size-4	32/4
12 < Size ≤ 20	4	Size-4	32/8
20 < Size ≤ 22	6	Size-6	48/8
22 < Size ≤ 30	6	Size-6	48/12
30 < Size ≤ 32	8	Size-8	64/12
:	:	:	:
500 < Size ≤ 510	102	Size-102	816/204
510 < Size ≤ 512	104	Size-104	832/204

Acyclic data (transient communication data) length is configured in ANYBUS_INIT as “total length” - “I/O length”.

Data transfer

The data to and from the application is transferred in transparent mode. The application is responsible for using the bit and word information in consistency with the selected CC-Link mode. A block of bit information is immediately followed by a block of word information.

2.2.2 I/O data: Fieldbus specific initialization mode

In this mode the application specifies the exact data size that is defined for each data type: RX-data, RY-data, RWr-data, and RWw-data. The sizes are set using the mailbox message FB_INIT, see “CC-Link IE Field Network initialization (FB_INIT)” on page 13. RX-data and RY-data are configurable in blocks of 16 bits. RWr-data and RWw-data are configurable in blocks of 4 words. In and out parameter data sizes are configurable in words.

The table below gives an example of how the data can be specified and what it corresponds to.

Data type	Size	Corresponds to
RX-data	80 (points)	10 bytes of CC-Link bit data in module IN area
RY-data	16 (points)	20 bytes of CC-Link bit data in module OUT area
RWr-data	20 (points)	40 bytes of CC-Link word data in module IN area
RWw-data	8 (points)	16 bytes of CC-Link word data in module Out area
In parameter	5 (words)	10 bytes of in parameter data
Out parameter	2 (words)	4 bytes of out parameter data

2.2.3 Master reconfiguration of I/O size

The Anybus-S CC-Link IE Field Network module acts as a slave on a CC-Link IE Field Network. The master of this network can set new lesser sizes of data. If this is the case, information will be available in the fieldbus specific area in the DPRAM. A mailbox will be sent from the module to the application, giving the new sizes. Please note that if the application receives such a mailbox, it can not send any data with larger size than what is given in the mailbox.

See also...

- “I/O data size has changed (IO_DATA_SIZE_CHANGED)” on page 30
- “Current Cyclic Size” on page 31

2.3 Initialization sequence

2.3.1 General

The I/O lengths specified in ANYBUS_INIT¹ must match the following criteria:

	Criteria	Default (bytes)
Input I/O Length:	>=0 byte	16
Input DPRAM Length:	<= Input I/O Length	16
Input Total Length:	= Input I/O Length	16
Output I/O Length:	>=0 byte	16
Output DPRAM Length:	<= Output I/O Length	16
Output Total Length:	= Output I/O Length	16

Additionally, when using CC-Link IE Fieldbus Network Intelligent Device mode, the specified I/O lengths must match the settings on the CC-Link network where the module acts as a slave, see “Master reconfiguration of I/O size” on page 9.

2.3.2 Generic Anybus-S mode

To operate in this mode, the Anybus-S CC-Link IE must be initialized with the following mailbox sequence:

1. START_INIT

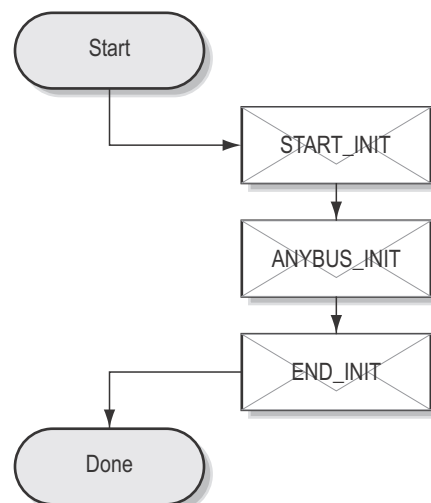
This command starts the initialization process.

2. ANYBUS_INIT

This command specifies the basic behavior of the module such as I/O sizes etc.

3. END_INIT

This command ends the initialization process.



1. Mailbox message used when initializing the module. It is described in the Anybus-S Parallel Design Guide

2.3.3 Initialization sequence, fieldbus specific mode

To operate in this mode, the Anybus-S CC-Link IE must be initialized with the following mailbox sequence:

1. **START_INIT**

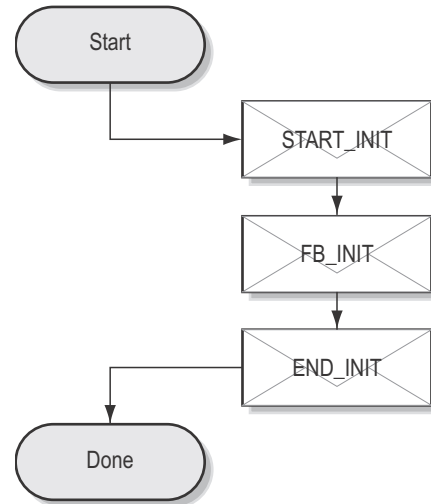
This command starts the initialization process.

2. **FB_INIT**

This mailbox enables the use of specific Anybus-S CC-Link IE Field Network sizes. For more information see “CC-Link IE Field Network initialization (FB_INIT)” on page 13.

3. **END_INIT**

This command ends the initialization process.



2.3.4 Initialization of the CC-Link network

The CC-Link network will be able to operate, using the same data size parameters, once the above initializing of the module is finalized without errors.

If the CC-Link network is initialized to exchange less I/O data or parameter data than the module, a spontaneous mailbox will be issued to the module, changing the data sizes, see “Master reconfiguration of I/O size” on page 9.

3. Fieldbus Specific Mailbox Messages

3.1 Fault information

When a mailbox message cannot be processed, the Message Information register in the header of the response will indicate that an error has occurred (consult the Anybus-S Parallel 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
0001h	NOT_ALLOWED	Mailbox message not allowed in current state
0002h	INVALID_DATA_VALUE	The mailbox command data not valid
0003h	CFN_CONFIG_ERROR	CC-Link configuration setting error, extended fault information available

3.2 General configuration messages

Messages in this category:

Mailbox Message	Page
CC-Link IE Field Network initialization (FB_INIT)	13
Configure node number (SET_NODE_NUMBER)	15
Configure network number (SET_NETWORK_NUMBER)	16
Set MAC address (SET_MAC_ADDR)	17
Get MAC address (GET_MAC_ADDR)	18
Set device identity (SET_DEVICE_IDENTITY)	19
Set cyclic stop mode (SET_CYCLIC_STOP_MODE)	21
Get the current HW switch setting (GET_DIPSWITCH)	22

3.2.1 CC-Link IE Field Network initialization (FB_INIT)

Description

This mailbox message is used to configure the CC-Link IE Field Network module network data to specific sizes. The message is used instead of the Anybus_INIT mailbox message.

Note: This command may only be issued during initialization.

Command initiator	Application
Command number	0001h
Extended Header data	-
Message data	Initialization parameter data, RX, RY, RWr and RWw size settings, I/O format settings, notification on I/O size change, in and out parameter sizes.
Response message	(the response holds a copy of the command data)

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message FB_INIT 22 bytes of data (11 words)</i>
Command	0001h	0001h	
Data size	0016h	0016h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	Extended fault information	
Extended word 8	-	Fault information	<i>See "Fault information" on page 12</i>
Message data word 1	Operation Mode	Operation Mode	
Message data word 2	Event Notification Config.	Event Notification Config.	
Message data word 3	Watchdog Timeout Value	Watchdog Timeout Value	
Message data word 4	RX size (points)	RX size (points)	
Message data word 5	RY size (points)	RY size (points)	
Message data word 6	RWr size (points)	RWr size (points)	
Message data word 7	RWw size (points)	RWw size (points)	
Message data word 8	Word Format	Word Format	
Message data word 9	Notify I/O size	Notify I/O size	
Message data word 10	In parameter size (points)	In parameter size (points)	
Message data word 11	Out parameter size (points)	Out parameter size (points)	

- **Operation Mode, Event Notification Config., Watchdog Timeout Value**
(See Anybus-S Parallel Design Guide, mailbox Anybus_INIT)
- **RX size**
RX size in points of the I/O area (bit information)

- **RY size**
RY size in points of the I/O area (bit information)
- **RWr size**
RWr size in points of the I/O area (16-bit word information)
- **RWw size**
RWw size in points of the I/O area (16-bit word information)
- **Word format**

Word Format	Description
0	Network format (Default)
1	Swap RWx data (big endian)
2 - 65535	(reserved)

- **Notify I/O size**

Notify I/O Size	Description
0 (disabled)	Request notification of change in I/O size from the module when the cyclic data size has been changed by the master.
1 (enabled)	

- **In parameter size (points)**
In parameter data size in points (16-bit word information)
- **Out parameter size (points)**
Out parameter data size in points (16-bit word information)

- **Extended fault information**

When 'fault information' indicates that extended fault information is available, additional information is available in Extended Word 7:

Error bit	Error	Description
0 (lsb)	RX size setting error	Error RX size. Too many points or wrong granularity.
1	RY size setting error	Error RY size. Too many points or wrong granularity.
2	RWr size setting error	Error RWr size. Too many points or wrong granularity.
3	RWw size setting error	Error RWw size. Too many points or wrong granularity.
4	RX+RWr size setting error	Total size error (RX size + RWr size). Too much data. Suggested size is returned du to the RX size chosen.
5	RY+RWw size setting error	Total size error (RY size + RWw size). Too much data. Suggested size is returned du to the RY size chosen.
6	Word format error	Illegal setting of word format
7	Notify I/O Size error	Illegal setting of Notify I/O Size
8	In data buffer size error	Too much data
9	Out data buffer size error	Too much data
10 - 15 (msb)	(reserved)	

3.2.2 Configure node number (SET_NODE_NUMBER)

Description

This mailbox message is used to configure the node number of the CFN module to a specific value.

Note: This command may only be issued during initialization.

Command initiator	Application
Command number	0002h
Extended Header data	-
Message data	Node number
Response message	(the response holds a copy of the command data)

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message SET_NODE_NUMBER 1 byte of data</i>
Command	0002h	0002h	
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	<i>See "Fault information" on page 12</i>
Message data byte 1	Node Number	Node Number	

- Node Number**

The CFN module will be configured with this value. (UINT8; valid range: 1 to 120)

3.2.3 Configure network number (SET_NETWORK_NUMBER)

Description

This mailbox message is used to configure the network number of the CFN module to a specific value.

Note: This command may only be issued during initialization.

Command initiator	Application
Command number	0003h
Extended Header data	-
Message data	Network number
Response message	(the response holds a copy of the command data)

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message SET_NETWORK_NUMBER 1 byte of data</i>
Command	0003h	0003h	
Data size	0001h	0001h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault information	<i>See "Fault information" on page 12</i>
Message data byte 1	Network Number	Network Number	

- Network Number**

The CFN module will be configured with this value. (UINT8; valid range: 1 to 239)

3.2.4 Set MAC address (SET_MAC_ADDR)

Description

This mailbox message is used to set the MAC address of the CFN module.

Note: This command may only be issued during initialization.

Command initiator	Application
Command number	0019h
Extended Header data	-
Message data	The new MAC address
Response message	(the response holds a copy of the command data)

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message SET_MAC_ADDR 6 bytes of data (3 words)</i>
Command	0019h	0019h	
Data size	0006h	0006h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault information	<i>See "Fault information" on page 12</i>
Message data word 1	MAC address byte 1, 2	MAC address byte 1, 2	<i>Byte 1, MSB</i>
Message data word 2	MAC address byte 3, 4	MAC address byte 3, 4	
Message data word 3	MAC address byte 5, 6	MAC address byte 5, 6	<i>Byte 6, LSB</i>

- **MAC Address**

The message data contains the new 6 byte MAC Address of the CFN module in big endian format. Byte 1 holds the most significant byte and Byte 6 holds the least significant byte (data type UINT8).

3.2.5 Get MAC address (GET_MAC_ADDR)

Description

This mailbox message is used to get the MAC address of the CFN module.

Note: This command can be issued at any time except during initialization.

Command initiator	Application
Command number	0010h
Extended Header data	-
Message data	No data
Response message	The MAC address of the module

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message GET_MAC_ADDR 6 bytes of data (3 words)</i>
Command	0010h	0010h	
Data size	0000h	0006h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault information	<i>See "Fault information" on page 12</i>
Message data word 1		MAC address byte 1, 2	<i>Byte 1, MSB</i>
Message data word 2		MAC address byte 3, 4	
Message data word 3		MAC address byte 5, 6	<i>Byte 6, LSB</i>

- MAC Address**

The response contains the 6 byte MAC Address of the CFN module in big endian format. Byte 1 holds the most significant byte and Byte 6 holds the least significant bit (data type UINT8).

3.2.6 Set device identity (SET_DEVICE_IDENTITY)

Description

This mailbox message is used to adapt the CFN node vendor and product identification. If it is not sent to the module during initialization, the module will use the default identification settings.

Note: This command may only be issued during initialization.

Command initiator	Application
Command number	0004h
Extended Header data	-
Message data	Vendor Code, Vendor Name, Model Type and Name, Unit Model Code and Version.
Response message	(the response holds a copy of the command data)

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message</i>
Command	0004h	0004h	<i>GET_MAC_ADDR</i>
Data size	003Dh	003Dh	<i>61 bytes of data</i>
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	<i>See "Fault information" on page 12</i>
Message data byte 1	See below	See below	<i>See below</i>
...	<i>...</i>
Message data byte 61	See below	See below	<i>See below</i>

- **Message data command/response details**

	Contents	Data type	Default	Comments
1 - 2	Vendor Code	UINT16 (big endian)	0212h (HMS)	Vendor code obtained from CLPA
3 - 34	Vendor Name	Array of char	"HMS Industrial Network AB"	Max 32 chars including ending null character. ^a
35 - 36	Device Type	UINT16 (big endian)	007Fh (Generic device)	Device type. Defines the profile, e.g. Generic device, PLC or Analog I/O.
37 - 56	Model Name	Array of char	"Anybus-S CFN"	Max 20 chars including ending null character. ^a
57 - 60	Unit Model Code	UINT32 (big endian)	-	Specific model code, optional
61	Version	UINT8	-	Should be incremented for each version.

a. The array will be cropped after the first null character. If no null character is submitted within the string, the last character will be replaced by a null character.

3.2.7 Set cyclic stop mode (SET_CYCLIC_STOP_MODE)

Description

This mailbox message defines how the module should handle OUT cyclic data when the network master shifts operation mode from RUN to STOP when there is still a LINK. The message also defines how the module should handle this data if the master station is in ERROR state.

Note: This command may only be issued during initialization.

Command initiator	Application
Command number	0101h
Extended Header data	Output action when the master is in STOP or ERROR state
Message data	No data
Response message	The response indicates if the command was accepted

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	Fieldbus Specific Message
Command	0101h	0101	SET_CYCLIC_STOP_MODE
Data size	0000h	0000h	No data
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	Output action	Output action	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault information	See "Fault information" on page 12

- Extended word 1, Output action**

Output action is used to configure what shall happen when the master shifts operation state to STOP or ERROR.

Value	Output action when master is in STOP/ERROR
0	Out area cleared (set to 0). Default
1	Out area freezed (hold)
2	Out area set (FFh)

3.2.8 Get the current HW switch setting (GET_DIPSWITCH)

Description

This mailbox message is used to get the current setting of the HW switch.

Note: This command can be issued at any time except during initialization.

Command initiator	Application
Command number	0008h
Extended Header data	-
Message data	No data
Response message	The DIP switch setting

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message GET_DIPSWITCH 1 byte of data</i>
Command	0008h	0008h	
Data size	0000h	0001h	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1			
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	-	
Message data byte 1	-	Switch setting	<i>Switch setting</i>

- Switch setting**

The response consists of 8 bits set by the DIP switch:.

Bit	Explanation
0	HW switch, DIP 1 (ON:1, OFF:0) - Node address setting, LSB
1	HW switch, DIP 2 (ON:1, OFF:0) - Node address setting
2	HW switch, DIP 3 (ON:1, OFF:0) - Node address setting
3	HW switch, DIP 4 (ON:1, OFF:0) - Node address setting
4	HW switch, DIP 5 (ON:1, OFF:0) - Node address setting
5	HW switch, DIP 6 (ON:1, OFF:0) - Node address setting
6	HW switch, DIP 7 (ON:1, OFF:0) - Node address setting
7	HW switch, DIP 8 - RD/SD or Link status indication (ON: LINK, OFF: RD/SD)

3.3 Runtime status mailbox messages

Messages in this category:

Mailbox Message	Page
Publish device status (SET_DEVICE_STATUS)	24
Get TX/RX counter information (GET_MIB_TXRX_COUNTER)	25
Get MAC port counter information (GET_MIB_MAC_PORT_INFO)	26
Get ring controller counter (GET_MIB_RING_CNTRL_INFO)	27
Get link down counter (GET_MIB_LINK_DOWN_INFO)	28
Clear all MIB information (CLEAR_MIB_INFO)	29
I/O data size has changed (IO_DATA_SIZE_CHANGED)	30

3.3.1 Publish device status (SET_DEVICE_STATUS)

This mailbox makes it possible to publish the device status on the network, according to the Device Status object #2 in the Device Profile.

Note: This mailbox may only be issued when the module is on-line.

Command initiator	Application
Command number	000Dh
Extended Header data	-
Message data	Application status: Run State, Error State, Error Code and Vendor Specific information.
Response message	(the response holds a copy of the command data)

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message SET_DEVICE_STATUS 10 bytes of data</i>
Command	000Dh	000Dh	
Data size	000Ah	000Ah	
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	<i>See "Fault information" on page 12</i>
Message data byte 1	See below	See below	<i>See below</i>
...
Message data byte 10	See below	See below	<i>See below</i>

- Message data command/response details

Byte(s)	Data type	Value	Explanation
1	UINT8	-	Application operating status:
		0	Application operating status not supported
		1	Application is stopped
		2	Application is running
		3	User application is not available
2	UINT8	-	Application error status
		0	No error
		1	Light error
		2	Normal error
		3	Fatal error
3 - 6	UINT32	-	Error code
7 - 10	UINT32	-	Vendor specific node information

3.3.2 Get TX/RX counter information (GET_MIB_TXRX_COUNTER)

This mailbox is used to collect the transmission/reception counter information.

Note: This mailbox may be issued once the initialization has started and onwards.

Command initiator	Application
Command number	0011h
Extended Header data	-
Message data	-
Response message	A copy of the MIB TX and RX counters

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message GET_MIB_TXRX_COUNTER 12 bytes of data (6 words)</i>
Command	0011h	0011h	
Data size	0000h	000Ch	
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	-	-	
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault information	<i>See "Fault information" on page 12</i>
Message data byte 1		See below	<i>See below</i>
...		...	<i>...</i>
Message data byte 12		See below	<i>See below</i>

- Message data response details

Byte(s)	Explanation
1 - 4	Received cycle frame counter
5 - 8	Received transient frame counter
9 - 12	Received transient frame reject/discard counter

3.3.3 Get MAC port counter information (GET_MIB_MAC_PORT_INFO)

This mailbox is used to get the MAC port 1 and port 2 counter information.

Note: This mailbox may be issued once initialization has started and onwards

Command initiator	Application
Command number	0012h
Extended Header data	Requested port number
Message data	-
Response message	A copy of the MIB MAC port counter information

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message</i>
Command	0012h	0012h	<i>GET_MIB_MAC_PORT_INFO</i>
Data size	0000h	002Ch	<i>44 bytes of data</i>
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	Port number	Port number	<i>Number of the requested port</i>
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault information	<i>See "Fault information" on page 12</i>
Message data byte 1		See below	<i>See below</i>
...		...	<i>...</i>
Message data byte 44		See below	<i>See below</i>

- Extended word 1, Port Number**

The extended word 1 gives the number of the requested port

- Message data response details**

Byte(s)	Explanation
1 - 4	Received frame counter
5 - 8	Sent frame counter
9 - 12	Received undersized frame counter
13 - 16	Received oversized frame counter
17 - 20	Received frame with FCS error counter
21 - 24	Received frame with erroneous fragment counter
25 - 28	Detected illegal inter-frame gap (IFG) counter
29 - 32	Detected illegal start-of-frame delimiter (SFD) counter
33 - 36	Received code error counter
37 - 40	Received False Carrier error counter
41 - 44	Received Carrier Extended error counter.

3.3.4 Get ring controller counter (GET_MIB_RING_CNTRL_INFO)

This mailbox is used to get ring controller counter information from port 1 and port 2.

Note: This mailbox may be issued once initialization has started and onwards

Command initiator	Application
Command number	0013h
Extended Header data	Requested port number
Message data	-
Response message	A copy of the MIB ring control counter information

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message</i>
Command	0013h	0013h	<i>GET_MIB_RING_CNTRL_INFO</i>
Data size	0000h	001Ch	<i>28 bytes of data</i>
Frame count	0001h	0001h	
Frame number	0001h	0001h	
Offset high	0000h	0000h	
Offset low	0000h	0000h	
Extended word 1	Port number	Port number	<i>Number of the requested port</i>
Extended word 2	-	-	
Extended word 3	-	-	
Extended word 4	-	-	
Extended word 5	-	-	
Extended word 6	-	-	
Extended word 7	-	-	
Extended word 8	-	Fault information	<i>See "Fault information" on page 12</i>
Message data byte 1		See below	<i>See below</i>
...		...	<i>...</i>
Message data byte 28		See below	<i>See below</i>

- Extended word 1, Port Number**

The extended word 1 gives the number of the requested port

- Message data response details**

Byte(s)	Explanation
1 - 4	MIB1: Frame with HEC error counter
5 - 8	MIB2: Frame with DCS/FCS error counter
9 - 12	MIB3: Undersized frame counter
13 - 16	MIB4: Repeated frame counter
17 - 20	MIB5: Upper forwarding frame counter
21 - 24	MIB6: Repeated buffer full discard counter
25 - 28	MIB7: Upward buffer full discard counter

3.3.5 Get link down counter (GET_MIB_LINK_DOWN_INFO)

This mailbox is used to get link down counter information from port 1 and port 2.

Note: This mailbox may be issued once initialization has started and onwards

Command initiator	Application
Command number	0014h
Extended Header data	-
Message data	-
Response message	A copy of the MIB link down counter information

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message</i>
Command	0014h	0014h	<i>GET_MIB_LINK_DOWN_IN</i>
Data size	0000h	0008h	<i>FO</i>
Frame count	0001h	0001h	<i>8bytes of data</i>
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	<i>See "Fault information" on</i>
Message data byte 1		See below	<i>page 12</i>
...		...	<i>See below</i>
Message data byte 8		See below	<i>See below</i>

- Message data response details

Byte(s)	Explanation
1 - 4	Link down counter (PORT1)
5 - 8	Link down counter (PORT2)

3.3.6 Clear all MIB information (CLEAR_MIB_INFO)

This mailbox is used to clear all MIB (port 1 and port 2).

Note: This mailbox may be issued once initialization has started and onwards

Command initiator	Application
Command number	0015h
Extended Header data	-
Message data	-
Response message	A copy of the MIB link down counter information

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message CLEAR_MIB_INFO</i>
Command	0015h	0015h	
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	<i>See "Fault information" on page 12</i>

3.3.7 I/O data size has changed (IO_DATA_SIZE_CHANGED)

This mailbox is used by the module to inform the application that the number of used bytes in the I/O area has changed to be smaller than initialized by the application. Please note that the mailbox will be sent only if the size of the I/O area has been reduced from what was initialized.

Note 1: This mailbox may be issued once initialization has started and onwards.

Note 2: This mailbox is issued by the Anybus-S CC-Link IE module and must be handled by the application. It will not be issued unless explicitly enabled in the FB_INIT mailbox, see page 13. The module will not issue a new mailbox until the application has answered the previous.

Command initiator	Module
Command number	000Eh
Extended Header data	-
Message data	New RXSize, RWrSize, RySize, and RWwSize
Response message	-

Command and response layout

	Command	Expected response	
Message ID	(ID)	(ID)	
Message information	4002h	0002h	<i>Fieldbus Specific Message IO_DATA_SIZE_CHANGED 8bytes of data</i>
Command	000Eh	000Eh	
Data size	0008h	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	<i>See "Fault information" on page 12</i>
Message data byte 1	See below		
...	...		
Message data byte 8	See below		

- Message data command details

Byte(s)	Explanation
1 - 2	UINT16 RySize - New size of the RY data
3 - 4	UINT16 RWwSize - New size of the RWw data
5 - 6	UINT16 RxSize - New size of the RX data
7 - 8	UINT16 RWrSize - New size of the RWr data

4. Fieldbus Specific Area

The fieldbus specific area in the DPM holds information from the CC-Link IE Field Network to the application. Big endian format is used if nothing else is stated.

Location	Contents
640h	Node Number
641h	Network Number
642h - 649h	Current Cyclic Size
64Ah - 64Dh	Cyclic Word Offset
64Eh - 64Fh	Cyclic Communication Status
650h	Port1State
651h	Port2State
652h	Master Application operating status
653h	Master Application error status
654h - 657h	Master Application error code
658h - 65Bh	Master Action Cmd
65Ch - 65Fh	Current parameter size
660h - 883h	Parameter offset

Node Number

Address	Access	Data type	Description
640h	RO	UINT8	Current node number

Network Number

Address	Access	Data type	Description
641h	RO	UINT8	Current network number

Current Cyclic Size

This area holds the size (in bytes), assigned by the application or the master¹, of the current cyclic communication.

Address	Access	Data type	Description
642h - 643h	RO	UINT16	RySize
644h - 645h			RWwSize
646h - 647h			RxSize
648h - 649h			RWrSize

Cyclic Word Offset

This area holds the offset to cyclic word data indexed from the start of each area.

Address	Access	Data type	Description
64Ah - 64Bh	RO	UINT16	RWwOffset: Offset to RWw data (in bytes)
64Ch - 64Dh			RWrOffset: Offset to RWr data (in bytes)

1. Using the parameter PDU

Cyclic Communication Status

These two bytes holds the current cyclic communication status.

Address	Access
64Ah - 64Bh	RO

Note: Little endian format is used.

Bit	Description										
2 - 0 (LSB)	Cyclic communication Parameter Status <table> <tr> <th>Value</th><th>Description</th></tr> <tr> <td>001b:</td><td>Received parameter is valid</td></tr> <tr> <td>010b:</td><td>no parameter available or wrong ID</td></tr> <tr> <td>011b:</td><td>Now checking parameter</td></tr> <tr> <td>100b:</td><td>Received parameter is invalid</td></tr> </table>	Value	Description	001b:	Received parameter is valid	010b:	no parameter available or wrong ID	011b:	Now checking parameter	100b:	Received parameter is invalid
Value	Description										
001b:	Received parameter is valid										
010b:	no parameter available or wrong ID										
011b:	Now checking parameter										
100b:	Received parameter is invalid										
3	Cyclic communication parameter check status 0: Check completed 1: Now checking										
4	Node number setting 0: Valid 1: Not valid (out of range)										
5	Reserved node setting 0: Not set as reserved node 1: Set as reserved node										
6	Cyclic operation setting (group) 0: Cyclic operation 1: Stop										
7	Cyclic operation setting (individual) 0: Cyclic operation 1: Stop										
8	(Reserved)										
9	Cyclic communication continuation error 0: No error 1: Error occurred										
10	Node number duplication 0: No duplication 1: Node number duplicated										
11	(reserved, set to 0)										
12	Node type error 0: No error 1: Error occurred										
13	(reserved, set to 0)										
14	Connection status 0: Normal 1: Disconnected										
15	Other communication stop 0: Normal communication 1: Cyclic communication stop due to other reason than mentioned above										

Port1State

Address	Access	Data type	Description
650h	RO	UINT8	Physical link status of port 1 0: Link down 1: Link up

Port2State

Address	Access	Data type	Description
651h	RO	UINT8	Physical link status of port 2 0: Link down 1: Link up

Master Application operating status

Address	Access	Data type	Description
652h	RO	BOOL	Application operating status according to the MyStatus-PDU from the master TRUE: Run FALSE: Stop

Master Application error status

Address	Access	Data type	Description
653h	RO	BOOL	Application error status according to the MyStatus-PDU from the master TRUE: Error occurred FALSE: No error

Master Application error code

Address	Access	Data type	Description
654h - 657h	RO	UINT32	Application error code from the MYStatus-PDU from the master 0: No error or no valid MyStatus form the master X: Error code

Master Action Cmd

This area holds the command status from the master station.

Address	Access
658h - 65Bh	RO

Note: Little endian format is used.

Bit	Description
0 (LSB)	Cyclic stop order (node number out of range) 1: Stop order
1	Cyclic stop order (reserved node setting) 1: Stop order
2	Cyclic stop order (master station's order) 1: Stop order
3	Cyclic stop order (node number out duplicated) 1: Stop order
4 - 15	(Reserved)
16	Illegal node type (node type assigned by master station does not match the actual node type) TRUE: Node type is illegal
17	Illegal assigned data size (the data size for the cyclic communication, that is assigned by the master station, is bigger than the maximum data size from the node) TRUE: Assigned data size is illegal
18 - 31 (MSB)	(reserved)

Current Parameter Size

This area holds the current parameter size (in bytes) assigned by the application.

Address	Access	Data type	Description
65Ch - 65Dh	RO	UINT16	In parameter size
65Eh - 65Fh			Out parameter size

Parameter Offset

This area holds the offset to parameter word data indexed from the start of each area.

Address	Access	Data type	Description
660h - 661h	RO	UINT16	Out parameter offset
662h - 663h			In parameter offset

A. Connectors

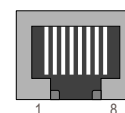
A.1 Application connector

(Consult the general Anybus-S Parallel Design Guide for more information)

A.2 Ethernet connector

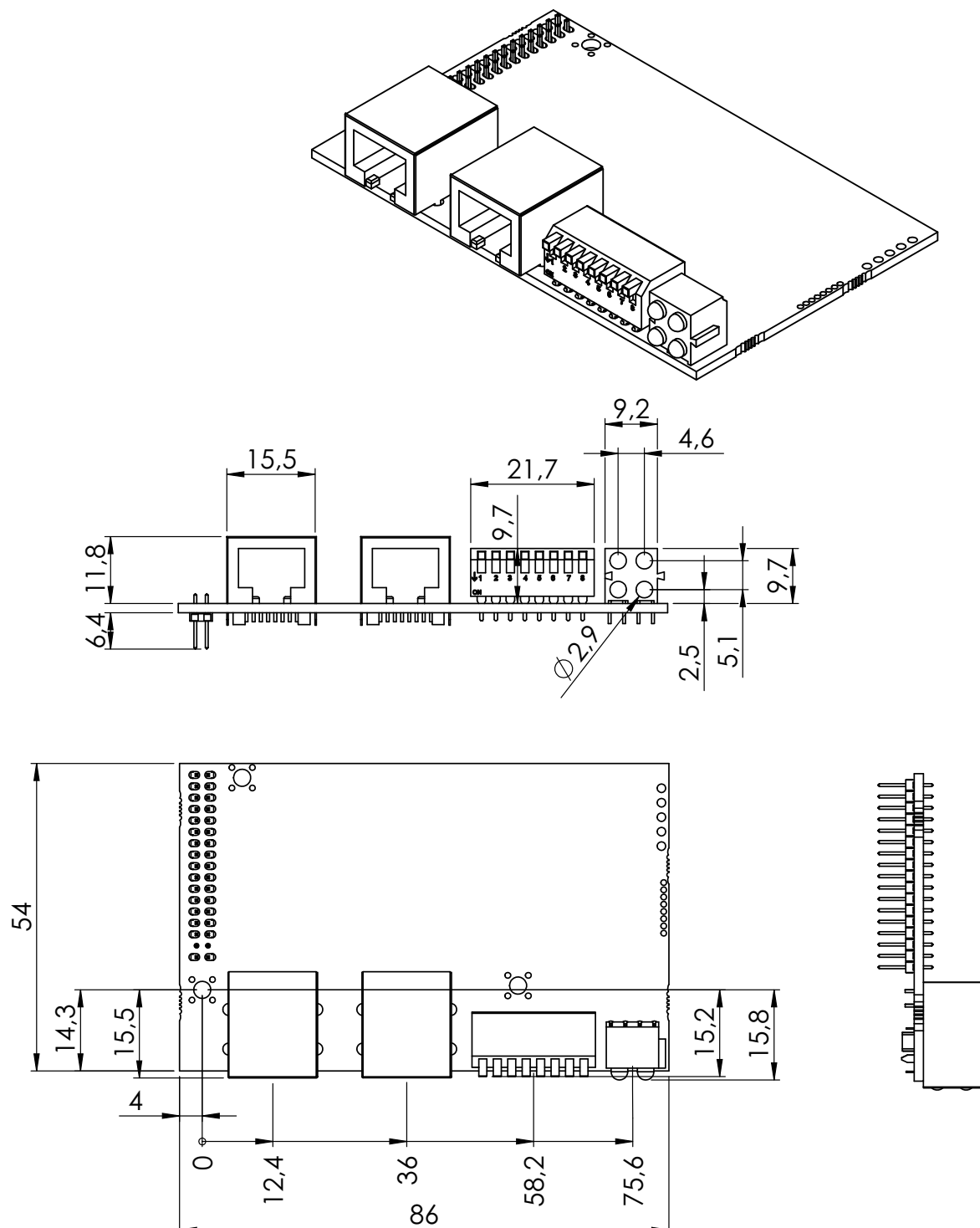
RJ45 (Standard)

Pin	Signal
1	TD+
2	TD-
3	RD+
4	Termination
5	Termination
6	RD-
7	Termination
8	Termination



B. Mechanical Specification

Note: All measurements expressed in this chapter are in millimeters and have a tolerance of $\pm 0.25\text{mm}$ unless otherwise stated.



C. Environmental Specification

C.1 Temperature

Operating

+0 to +70 degrees Celsius

Test performed according to EN 60068.

Non Operating

-15 to +85 degrees Celsius

Test performed according to EN 60068.

C.2 Relative Humidity

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

Test performed according to EN 60068.

C.3 EMC (CE) Pre-compliance

EMC pre-compliance testing has been conducted according to the Electromagnetic Compatibility Directive 2004/108/EC.

Some deviations have been recorded concerning radiated emission. If the Anybus-S CC-Link IE module is enclosed in a metallic casing, it fulfills all standards. Without a metallic casing it fulfills all standards except radiated emission.

D. Technical Specification

D.1 Power supply

Supply voltage

Both the module electronics and the fieldbus interface require a regulated 5 VDC power supply. For more information regarding power requirements, consult the Anybus-S Design Guide.

Power consumption

The maximum power consumption is 75 mA on the bus interface, 525 mA on the module electronics. The total current consumption for both power ports is 600 mA.

Note: These values differ from what is specified in the Anybus-S Design Guide for the modules in the Anybus-S product group.

D.2 Shielding/protective earth

A connection to PE is provided through one of the front mounting holes according to the Anybus-S specification

D.3 Galvanic isolation

The bus power is separated from other electronics via an onboard DC/DC converter. The send and receive signals are isolated via opto-couplers.