Design Guide

COMX

Communication Modules

Hilscher Gesellschaft für Systemautomation mbH

www.hilscher.com

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Table of Contents

1 Introduction

1.1 About this Document

COMX means **Co**mmunication **M**odules net**X**. These modules provide a universal and easy to use fieldbus interface for integration on various host systems. Through the set of standard application interfaces and the same board dimensions in each COMX family it is easy to switch between the different fieldbus systems, e.g. PROFIBUS DP, CANopen, DeviceNet, CC-Link or Ethernet by changing the module.

This manual describes only the hardware part of the modules.

The COMX communication modules is a generation of Modules and offer beside fieldbus communication also Real-Time Ethernet communication. The application interface is different (not compatible) compared to COM Modules. The application interface of the COMX Modules is common to all our COMX communication modules, and PC cards CIFX and netJACK communication modules described in our toolkit manual, dual-port memory interface manual and the Real Time Ethernet respectively fieldbus related details are defined in our Protocol API Manuals.

COM Modules are the previous generation of communication modules. The COM Modules are described in an own manual. The following two tables give a comparison of both COM and COMX Modules.

1.2 Comparison COMX and COM Modules

Basic differences between COM and COMX

	COM	COMX
Processor	EC1	netX
Host Interface	8 Bit	8 / 16 Bit
Dual-Port Memory size	2 KByte or 8 KByte	8 KByte or 16 KByte see section *Dual-Port Memory Size* on page 65
USB Interface	No	Yes

Table 1: Basic differences between COM and COMX

Comparison of supported protocols for COM and COMX

	COM	COMX (in this manual)
AS-Interface Master	supported	-
CANopen Master	supported	supported
CANopen Slave	supported	supported
CC-Link Slave	supported	supported
CompoNet Slave	-	in preparation
DeviceNet Master	supported	supported
DeviceNet Slave	supported	supported
InterBus Slave	supported	not supported by netX technology
PROFIBUS DP Master	supported	supported
PROFIBUS DP Slave	supported	supported
PROFIBUS MPI	supported	supported
sercos II (second generation)	supported	not supported by netX technology
EtherCAT Master	-	supported
EtherCAT Slave	-	supported
EtherNet/IP Scanner (Master)	-	supported
EtherNet/IP Adapter (Slave)	supported	supported
Open Modbus/TCP	supported	supported
POWERLINK Controlled Node	-	supported
PROFINET IO RT Controller	-	supported
PROFINET IO RT Device	-	supported
sercos Master (third generation)	-	supported
sercos Slave (third generation)	-	supported
VARAN Client (Slave)	-	supported

Table 2: Comparison of supported protocols for COM and COMX

1.3 List of Revisions

Rev	Date	Name	Chapter	Revision
12	2011-08-03	RG HH		Separation of documents for COM and COMX. This manual contains the description for COMX. Section *Module Names* added. Section *References* added. Modules names renamed in the complete document as listed in *Table 4*. Section *Mechanical Dimensions of COMX Modules*: minimum space requirements for CN type added. Section *Mechanical Dimensions of COMX Modules*: updated to M0200376_2, updated to M0200466_2, updated to M0300634, M1100041 new, updated to M0600173, updated to M0900162, M1100051 new Section *Type of Connector*: Text position corrected. Added info on grounding of 2 metal blocks in section *Mounting of COMX Modules.* Section *Mounting of COMX Modules*: M0200402 updated, M0900161 updated. Error correction of Symbol for Pin 3 in *Table 33: Fieldbus Connector X2 for Real Time Ethernet.* Section *Timing Diagram parallel Dual-Port* Memory Interface: Timing for read and write in one timing diagram Section *Timing Diagram parallel Dual-Port* Memory Interface: important note 1 clarified to avoid dual-port memory access errors. Section *SYNC Signals* added. Added orange states of LED for sercos III Slave V3 in *sercos III Slave*. Low active signals with 'n' instead of '#'.
13	2011-09-30	HH		Section *Mechanical Dimensions of COMX Modules*: updated to M1100042 (Correction dimension from 5,08 to 2,54), updated to M1100052 Section *Meaning of the Address Switch* added Meaning of LEDs moved to 'comX User Manual'.
14	2011-10-05	HH		Section *Timing Diagram parallel Dual-Port* Memory Interface: Timing Diagram updated, Timing values for COMX 100, COMX 50 and common values added (Table 35).
15	2012-03-22	HH MP		COMX 10CA-DPS, COMX 10CN-DPS, COMX 10CA-DNS, COMX 10CN-DNS, COMX 10CA-COS, COMX 10CN-COS, COMX 10CA-CCS, COMX 10CN-CCS, COMX 50CA-REFO communication modules added New Protocols: VARAN Client (Slave), PROFIBUS MPI
			2.2.2	Section *Mechanical Dimensions of COMX Modules*: updated to M0300636, M1100121 added, M1100131 added, updated to M0900164, updated to M0600174
			2.6	Section *Meaning of the Address Switch*: Sections *PROFIBUS DP Slave*, *CANopen Slave*, *DeviceNet Slave* and *COMX 10CA-CCS and COMX 10CN-CCS* added
			3.1.1	Section *Host Interface: Parallel or serial Dual-Port Memory Mode* added New: Serial dual-port memory mode (for COMX 10)
			3.1.2	Section *COMX Pinning of the System Bus Connector X1 – Parallel Mode*: - COMX 10 - Symbol names for signals with new convention used (DPM_...). - Information about PAD type added
			3.1.3	Section *COMX Pinning of the System Bus Connector X1 – Serial Mode* for COMX 10 added
			3.1.5.1	Section *Fieldbus Connector X2 for CC-Link Slave* added
			3.1.7.7	Section *Timing Diagram parallel Dual-Port Memory* Interface: COMX 10 values added (Table 35).
			3.1.8	Section *Signals of the Host Interface – Serial Dual-Port Memory Mode* added
			3.2	Section *Fieldbus Interface* added
			4.1	Section *Dual-Port Memory Size* added
			4.2	Section *Product Tests* COMX 10xx-xxx and COMX 50CA-REFO added
16	2012-07-11	RG	4	Current consumption values of COMX 10xx-xxx and COMX 50CA-REFO updated

Table 3: List of Revisions

1.4 Technical Features

Common Technical Features for COMX

- All leading Fieldbus and Real Time Ethernet Protocols available as Master and Slave
- One common hardware for all Real Time Ethernet Protocols
- Easy to use dual-port memory interface, with additional serial and diagnostic interface
- USB or serial diagnostic interface at COMX
- Host interface is designed for 8 KBytes (COMX 10) and for 16 KByte (COMX 50 and COMX 100) address space of the dual-port memory with selectable bus width of 8 or 16 bit.
- 3.3 V power supply reduces power consumption
- Small footprint for the host connector with 50 mil grid
- Solid mechanical assembly and a massive connection to earth ground by metal blocks special design for the requirements of the modules with fieldbus connector
- Two dowels for exact mounting of the module on the host board
- Metal blocks can easily modified for special customer requirements
- Front panel can be mounted on the metal blocks that the modules have always the same front size and covers the fieldbus connector
- Many modules are available in extended temperature specification (operating temperature range -20°C … +65°C)
- COMX 10 modules have address switches to set the bus address
- COMX 10 modules offer a serial dual-port memory mode as interface to the host

CA and CN Types of COMX Modules

For the COMX family, Hilscher offers modules with angled and without fieldbus connectors:

- COMX 10CN and COMX 100CN
  COMX Modules without fieldbus respectively Ethernet connector
- COMX 10CA, COMX 50CA and COMX 100CA
  COMX Modules with angled fieldbus, Ethernet respectively fiber optics connector

Description of COMX Modules

All COMX have a powerful processor and a complete fieldbus respectively Real-Time Ethernet interface including isolated drivers and the connector according to the standard.

All boards require only a single stabilized 3.3 Voltage. All other voltages are created by DC/DC converter on the COMX Module.

The access to the COMX Module is through the dual-port memory which can be easily integrated as a static memory device. It has a non multiplexed 8 or 16 bit data bus with several control lines to the host system. Between the COMX Module and the host system it is possible to generate interrupts for data handling.

Generally the firmware and the configuration data are stored permanently in FLASH memory by loading the data through the dual-port memory.

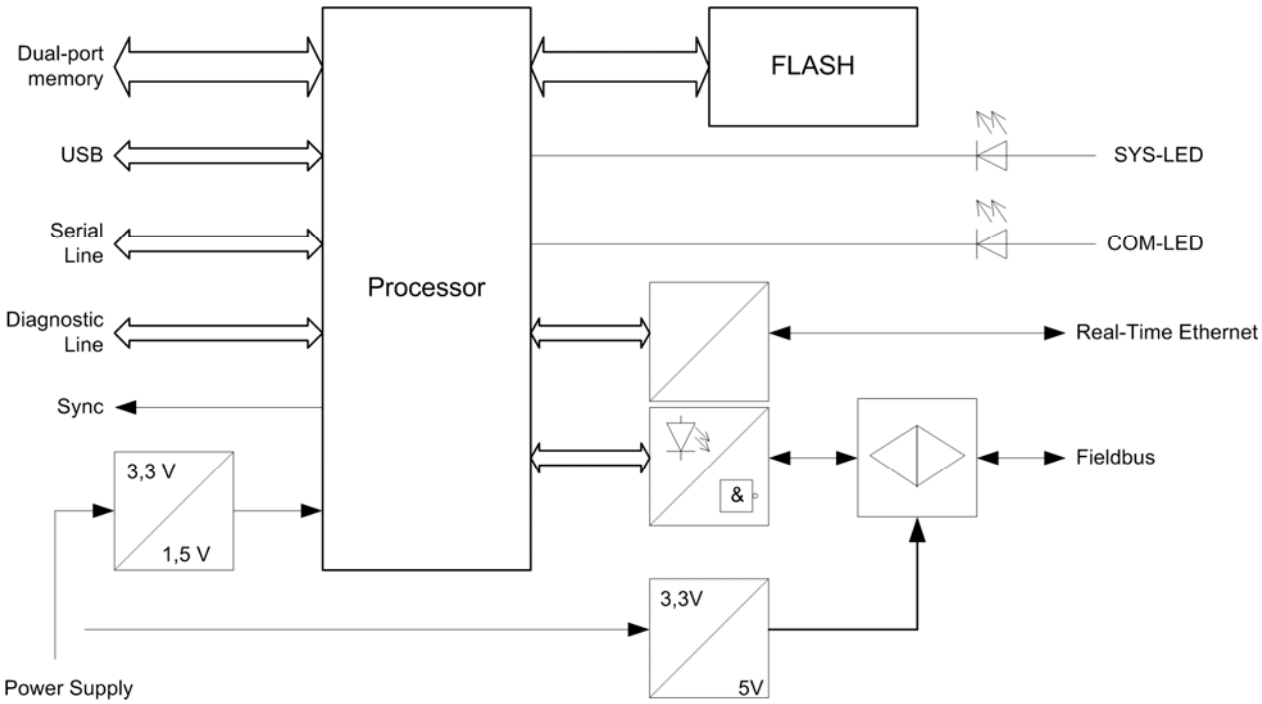

Figure 1: Block Diagram of the COMX Modules

1.5 Module Names

The following table lists all COMX modules. The range of products will be expanded with COMX modules with netX 10 or with netX 50. As a result of this expansion, it was necessary to rename the existing COMX modules by adding ‘100’ to the name, which indicates that netX 100 is used on the module respectively by adding ‘50’ to the name, which indicates that netX 50 is used etc.

Communication System	Old Module Name	New Module Name
Real-Time Ethernet	COMX-CA-RE	COMX 100CA-RE
	COMX-CN-RE	COMX 100CN-RE
	-	COMX 50CA-REFO
CANopen Master	COMX-CA-COM	COMX 100CA-CO
	COMX-CN-COM	COMX 100CN-CO
CANopen Slave	COMX-CA-COS	COMX 100CA-CO
	COMX-CN-COS	COMX 100CN-CO
	-	COMX 10CA-COS
	-	COMX 10CN-COS
CC-Link Slave	COMX-CA-CCS	COMX 50CA-CCS
	-	COMX 10CA-CCS
	-	COMX 10CN-CCS
DeviceNet Master	COMX-CA-DNM	COMX 100CA-DN
	COMX-CN-DNM	COMX 100CN-DN
DeviceNet Slave	COMX-CA-DNS	COMX 100CA-DN
	COMX-CN-DNS	COMX 100CN-DN
	-	COMX 10CA-DNS
	-	COMX 10CN-DNS
PROFIBUS DP Master	COMX-CA-DPM	COMX 100CA-DP
	COMX-CN-DPM	COMX 100CN-DP
PROFIBUS DP Slave	COMX-CA-DPS	COMX 100CA-DP
	COMX-CN-DPS	COMX 100CN-DP
	-	COMX 10CA-DPS
	-	COMX 10CN-DPS

Table 4: comX Modules – Old and new Names

1.6 References to Documents

This document refers to the following documents:

[1] Hilscher Gesellschaft für Systemautomation mbH: Dual-Port Memory Interface Manual, netX based products, Revision 12, english, 2012

[2] Hilscher Gesellschaft für Systemautomation mbH: User Manual, comX, Communication Modules for Real-Time Ethernet and Fieldbus, Revision 3, english, 2012

[3] Hilscher Gesellschaft für Systemautomation mbH: Benutzerhandbuch, comX, Kommunicationsmodule für Real-Time Ethernet und Feldbus, Revision 3, german, 2012

[4] Hilscher Gesellschaft für Systemautomation mbH: Getting Started Guide, Serial Dual-Port Memory Interface with netX, Revision 1, english, 2012

[5] Hilscher Gesellschaft für Systemautomation mbH: Technical Data Reference Guide, netX 10, Revision 0.9, english, 2011-12

Table 5: References to Documents

1.7 Legal Notes

1.7.1 Copyright

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2 Design-In - Mechanical Aspects

2.1 Type of COMX Modules

The following table gives an overview on the availability of the different COMX Modules.

Module	Fieldbus / Protocol	Type	Connector
COMX 10			
COMX 10CA-COS	CANopen	Slave	angled
COMX 10CN-COS	CANopen	Slave	no
COMX 10CA-CCS	CC-Link	Slave	angled
COMX 10CN-CCS	CC-Link	Slave	no
COMX 10CA-DPS	PROFIBUS DP	Slave	angled
COMX 10CN-DPS	PROFIBUS DP	Slave	no
COMX 10CA-DNS	DeviceNet	Slave	angled
COMX 10CN-DNS	DeviceNet	Slave	no
COMX 50			
COMX 50CA-CCS	CC-Link	Slave	angled
COMX 50CA-REFO	PROFINET IO	Device	angled
COMX 100			
COMX 100CA-CO	CANopen	Master or Slave (depends on loaded firmware)	angled
COMX 100CN-CO	CANopen	Master or Slave (depends on loaded firmware)	no
COMX 100CA-DN	DeviceNet	Master or Slave (depends on loaded firmware)	angled
COMX 100CN-DN	DeviceNet	Master or Slave (depends on loaded firmware)	no
COMX 100CA-DP	PROFIBUS DP	Master or Slave (depends on loaded firmware)	angled
COMX 100CN-DP	PROFIBUS DP	Master or Slave (depends on loaded firmware)	no
COMX 100CA-RE	Realtime Ethernet	Master or Slave (depends on loaded firmware)	angled
COMX 100CN-RE	Realtime Ethernet	Master or Slave (depends on loaded firmware)	no

Table 6: Available comX Modules

The following figures show the position of connector X1 and X2.

CA Types

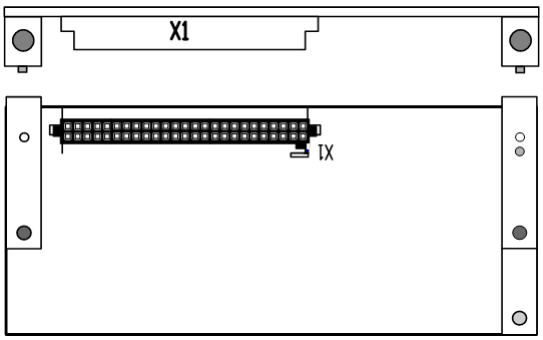


Figure 2: COMX CA Type - Connector X1

CN Types

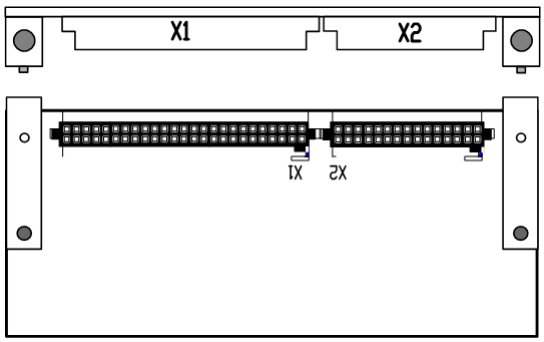


Figure 3: COMX CN Type - Connectors X1 and X2

2.2 Mechanical Dimensions

2.2.1 Common Mechanical Dimensions for COMX Modules

After mounting the COMX-CA Module parallel at a basis board the rotary switches, LEDs and the fieldbus connector are on the top side and are angled to the basis board. The edge of all front elements are in one layer which is 2.5 mm ahead of the edge of printed circuit board of the COMX Module.

The COMX-CN Module has to be used if the mechanical dimensions or order of the LEDs, switches and fieldbus connector does not fit. In that case you have to place these components directly on the motherboard and feed the signals to the connector X2 of the COMX-CN Module.

Note Please take care on the isolation distance, because the optical isolation interface is on the module!
Especially for 12 MBit PROFIBUS the distance should be as small as possible.
For Ethernet the signal traces should run parallel and should have the same length.
Please refer at the fieldbus standards for further information!

2.2.2 Mechanical Dimensions of COMX Modules

The COMX Module has a board size of 30 x 70 mm.

The maximum height of the components at the top side of the printed circuit board is 14.0 mm including the fieldbus connector which is also the component defining the height of the CA type. For the CN type, the parts defining the height of these modules are the DC/DC converter and the transformer.

In order to assure the long-term availability of the modules, Hilscher claims the right to perform a redesign if necessary due to changes in availability of components and to exchange these components by similar ones which might differ in their dimensions.

In detail, the current minimum space requirements are given by the following table right below.

COMX Module	Minimum required space on top of top side of the printed circuit board
CA type	14 mm
CN type	9 mm

Table 7: Minimum Required Space on top of Top Side of the Printed Circuit Board

However, in order

- to be able to exchange a COMX module against any other type of COMX module later
- and to be sure that future COMX modules which might have been affected by a redesign will fit under any circumstances
- and to avoid thermal problems,

we urgently recommend to obey the following rule:

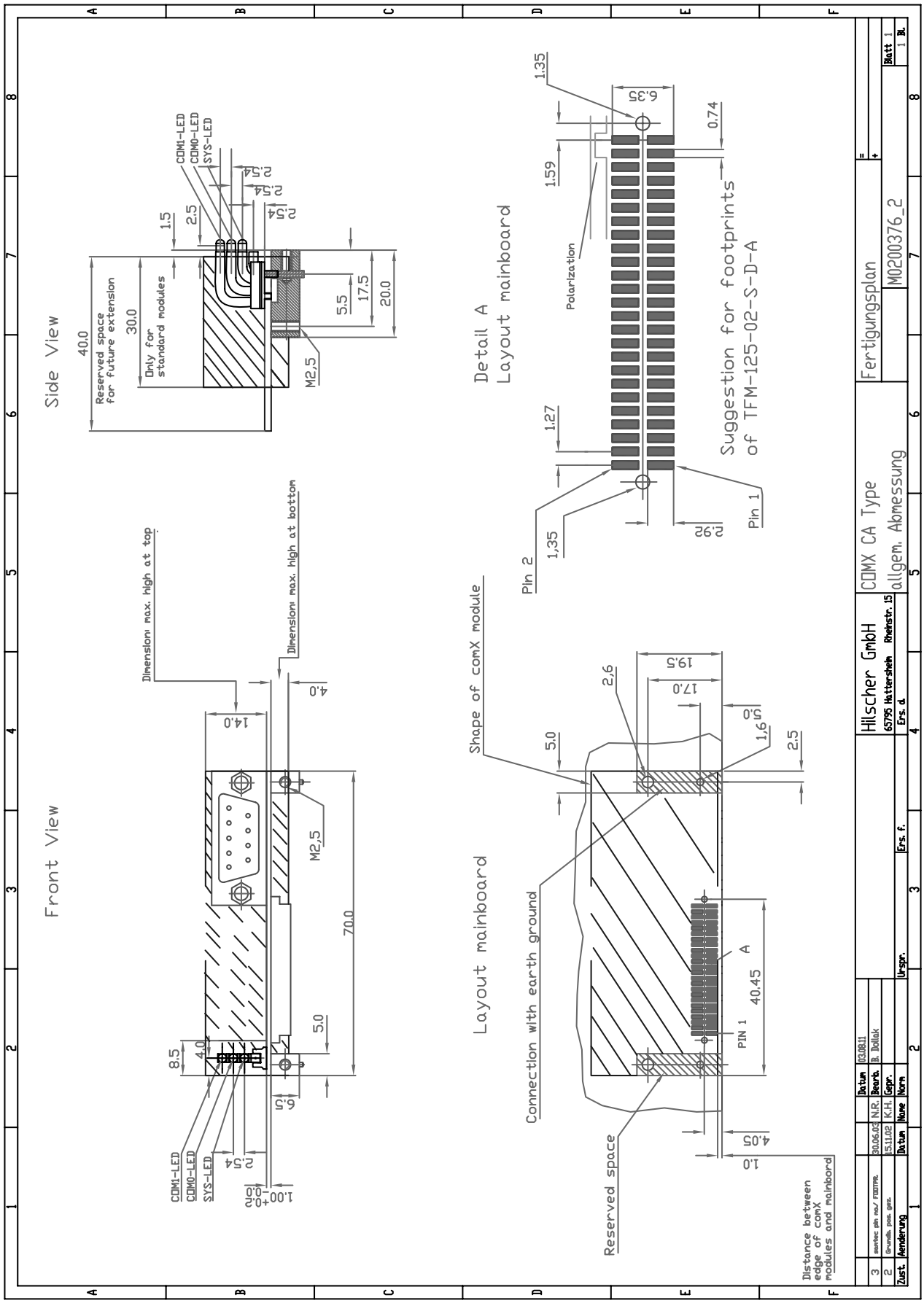
Note: Keep the space of 14.0 mm above the top side of the COMX modules free.

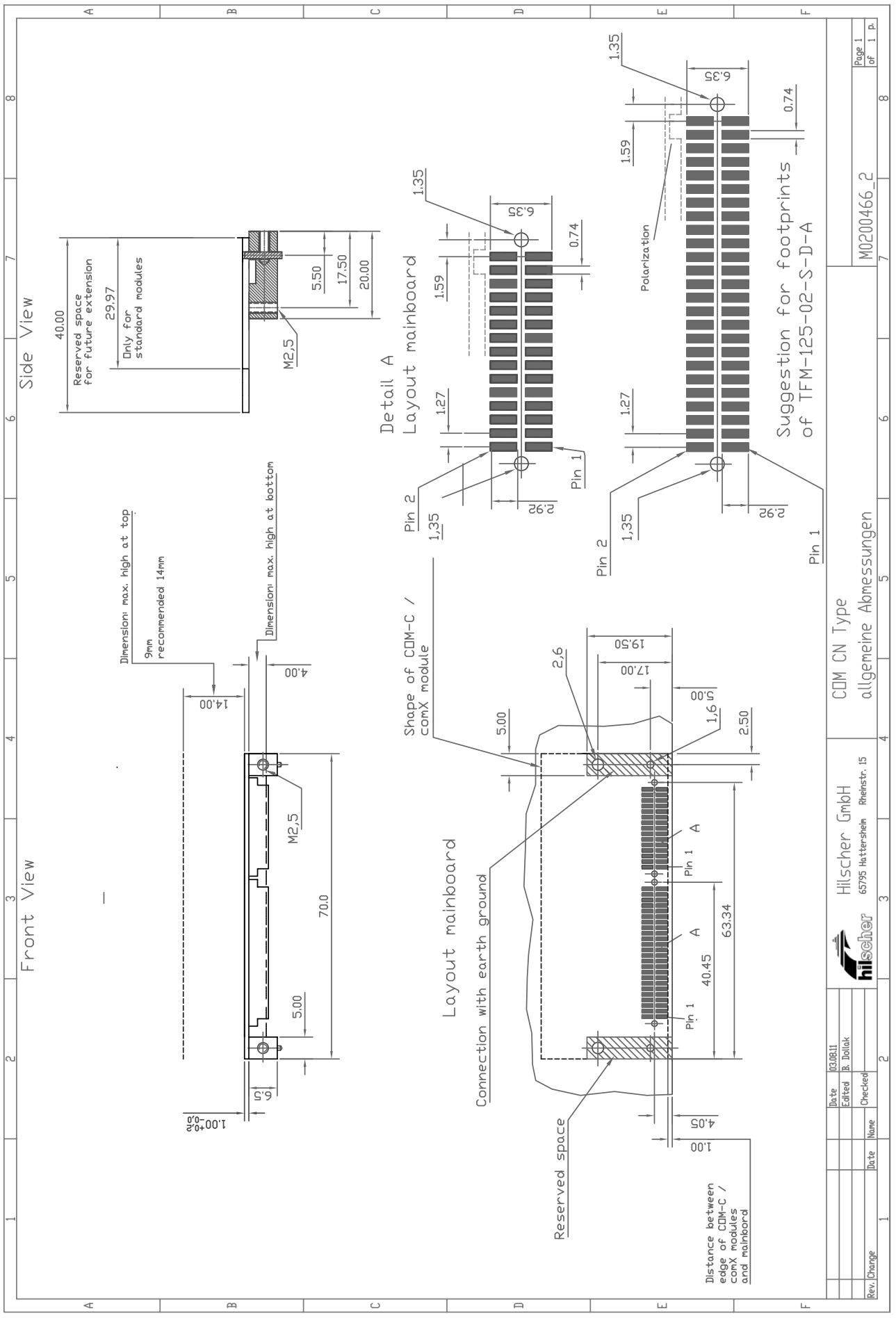
At the bottom side the maximum height is 4.0 mm, therefore you have 2.5 mm space for components on the host board below the module. The power dissipation in that area should be less than 330 mW!

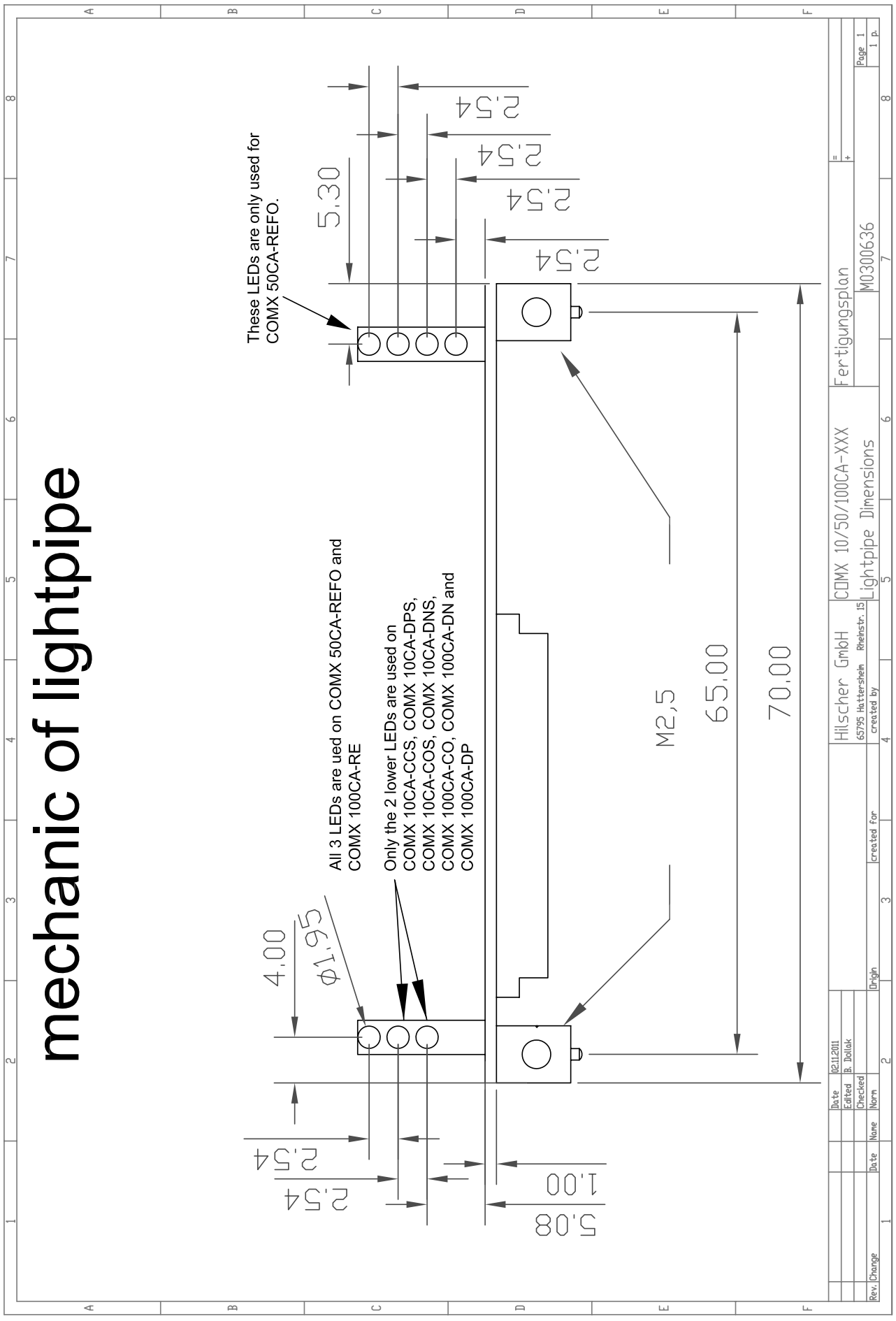
For further module development please reserve additional 10 mm space behind the module. There are a few larger fieldbus interfaces which does not fit on the small board space. In that case a second printed circuit board will be mounted on top of the module and the 10 mm space is necessary for the connection with flex stripe between these boards.

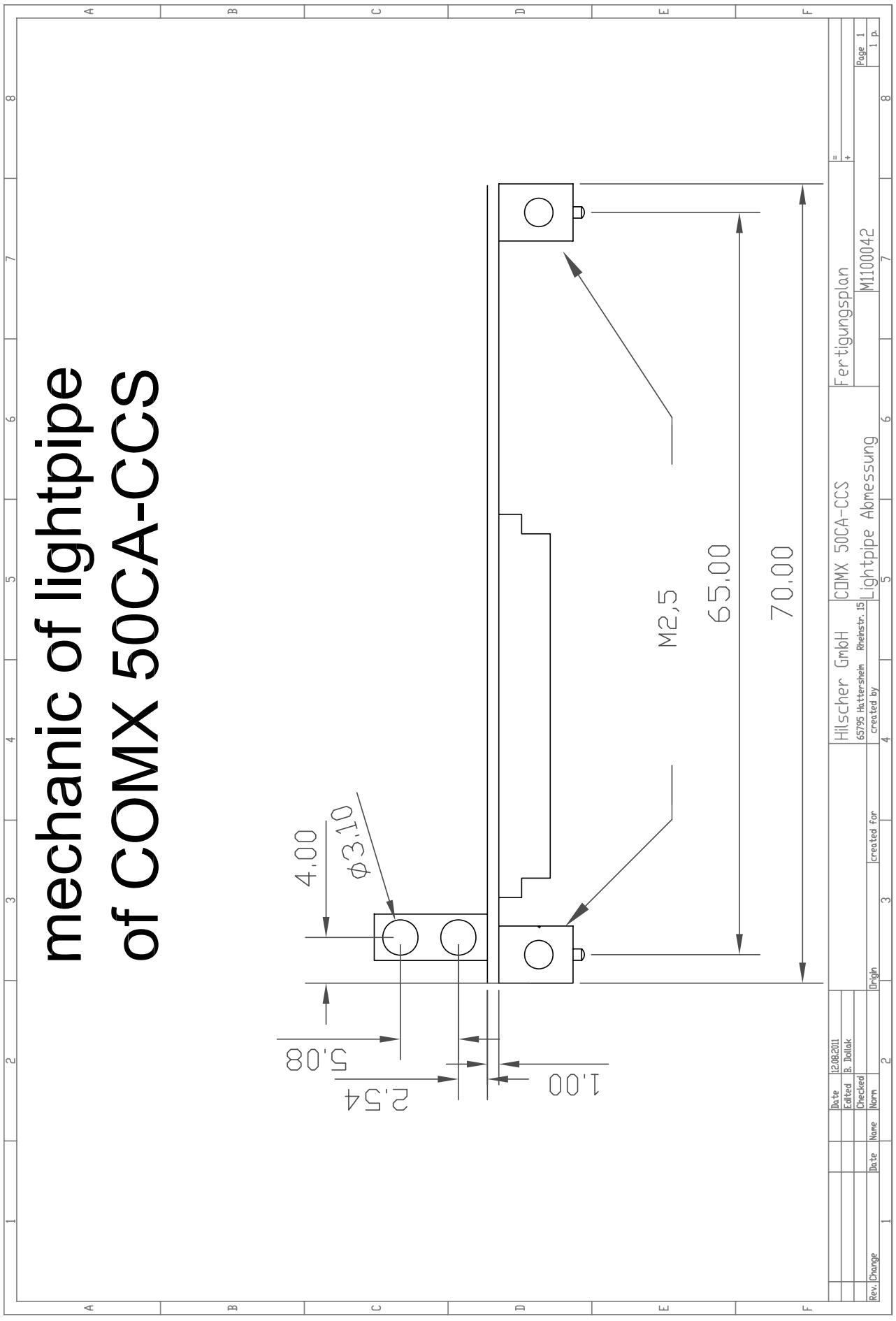
The general dimensions of the COMX Modules are shown on the following drawings:

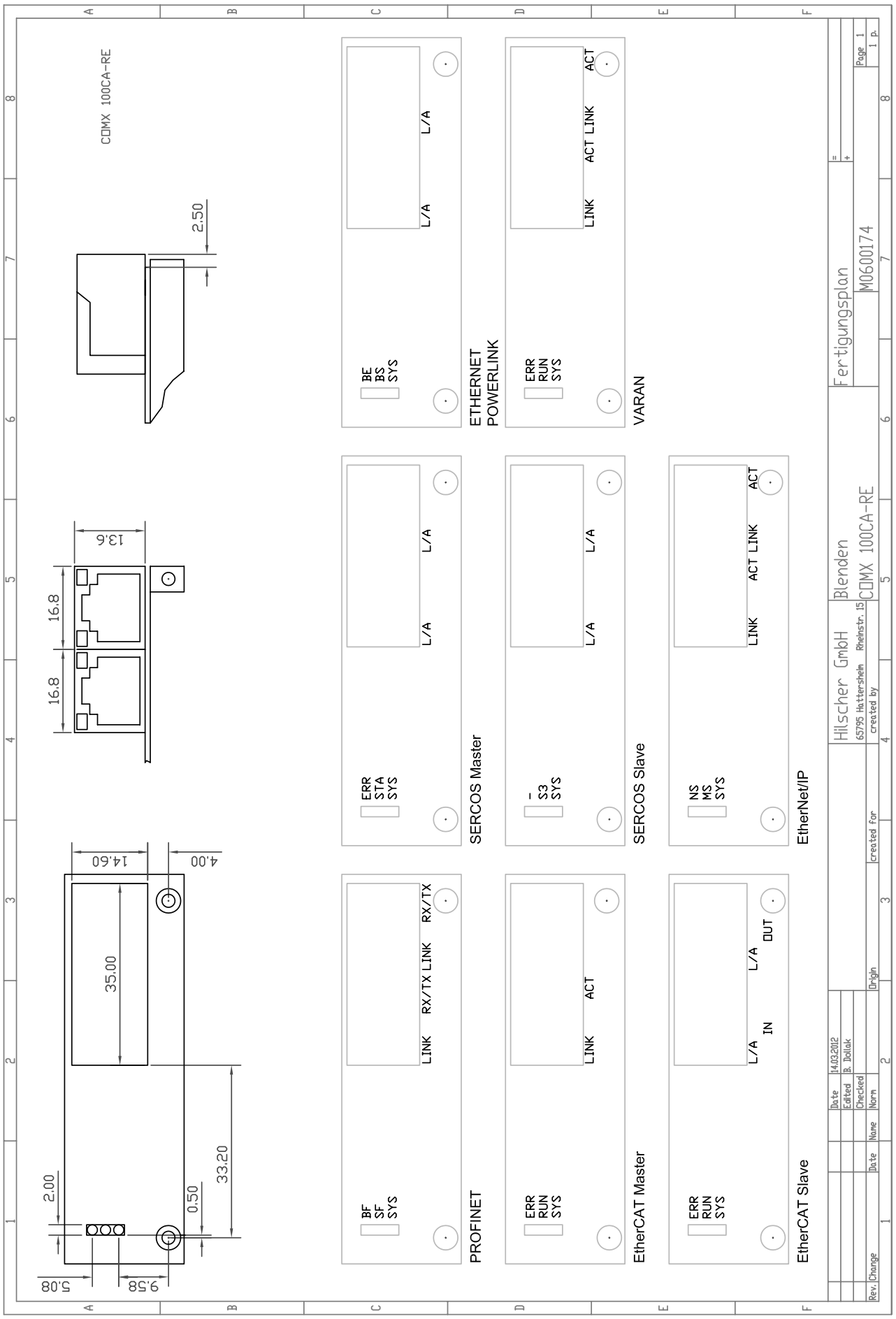
- M0200376 General Mechanical dimension of COMX-CA-XXX
- M0200466 Mechanical dimension of COMX-CN-XXX
- M0300636 Mechanical dimension of light pipe of COMX 10/50/100CA-XXX
- M1100042 Mechanical dimension of light pipe of COMX 50CA-CCS
- M0600174 Mechanical dimension of cover and connector of COMX 100CA-RE
- M1100121 Mechanical dimension of cover and connector of COMX 50CA-REFO
- M1100131 Mechanical dimension of cover and connector of COMX 10CA-XXX (fieldbus)
- M0900164 Mechanical dimension of cover and connector of COMX 100CA-XXX (fieldbus)
- M1100052 Mechanical dimension of cover and rotary switch of COMX 50-CA-CCS

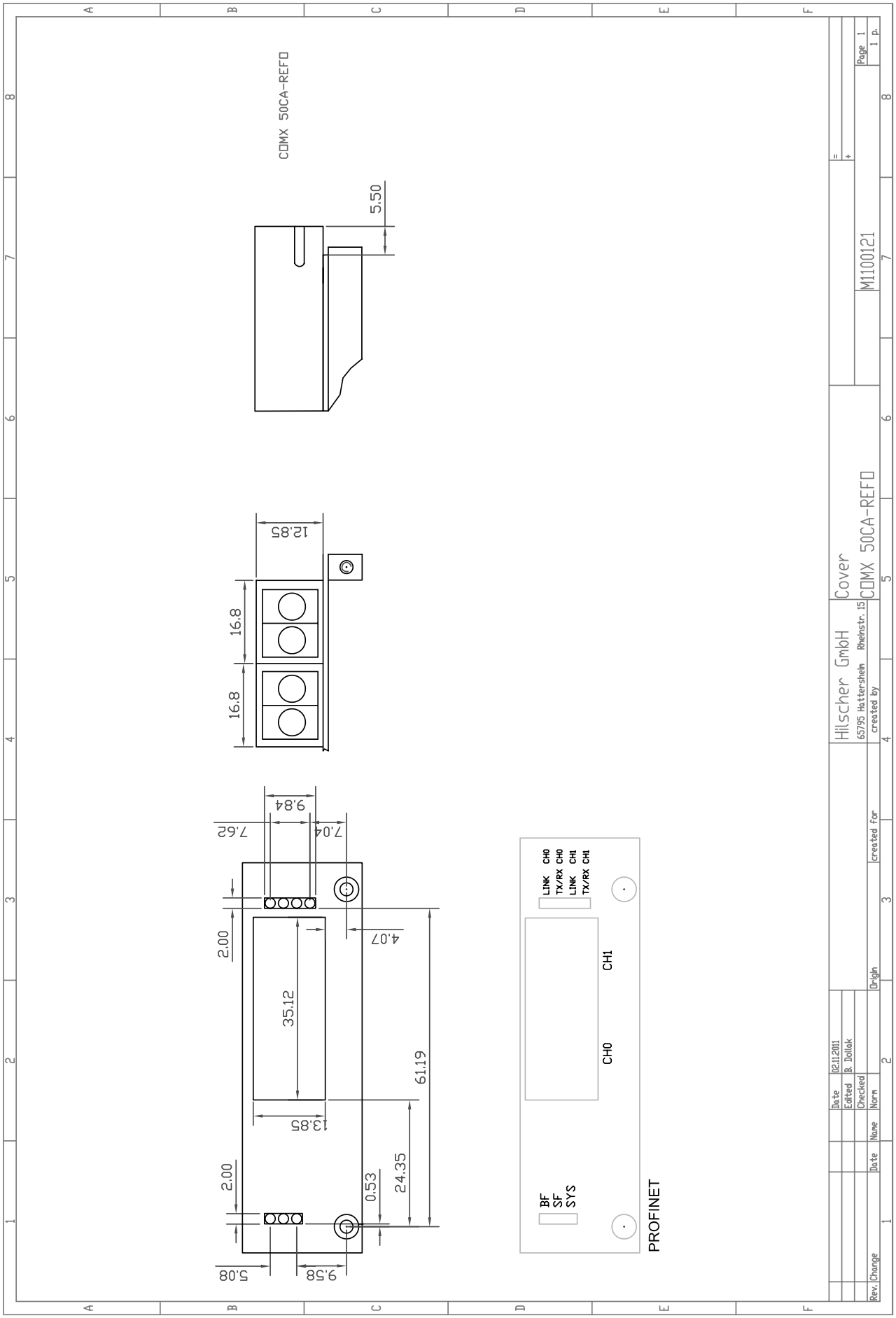


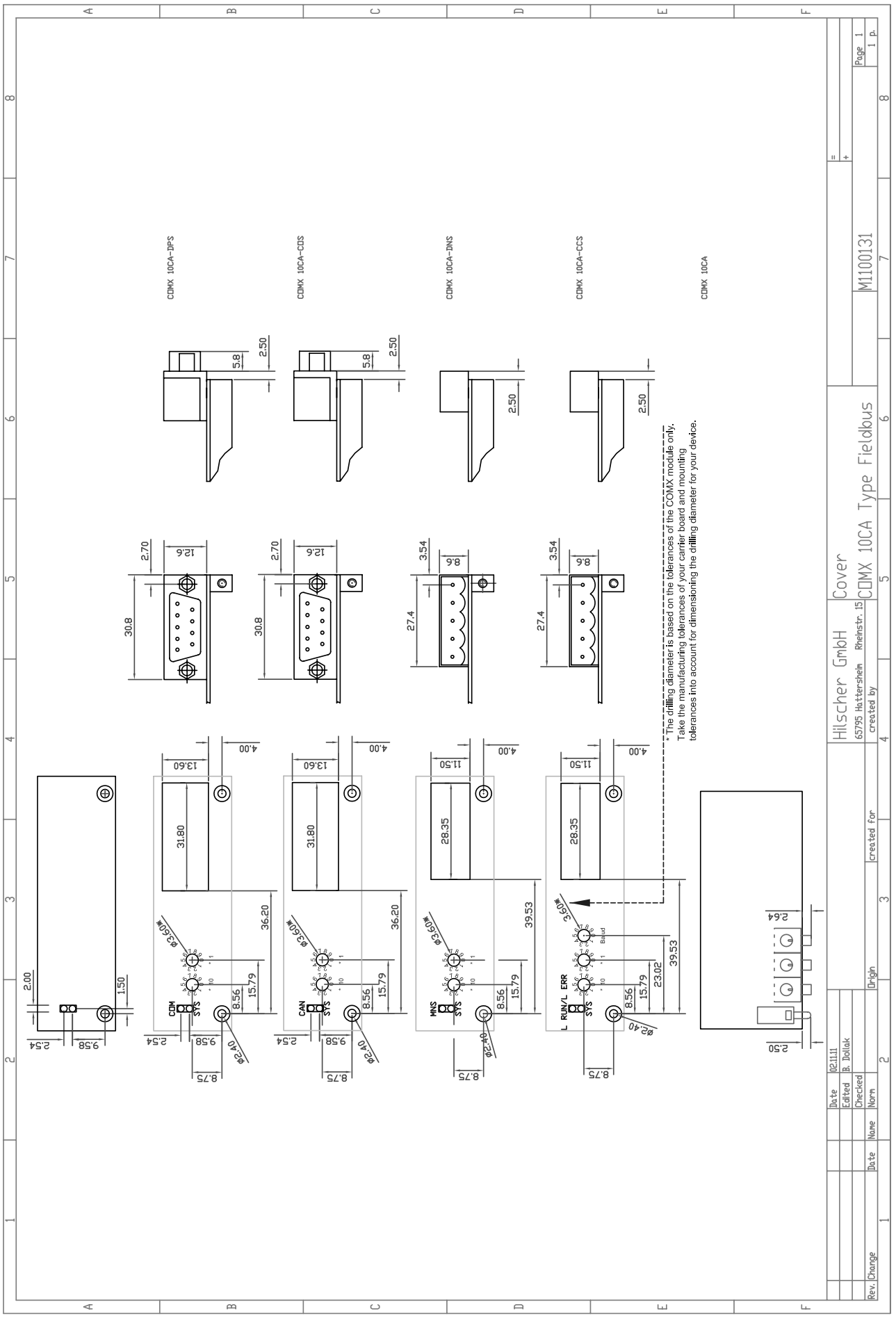


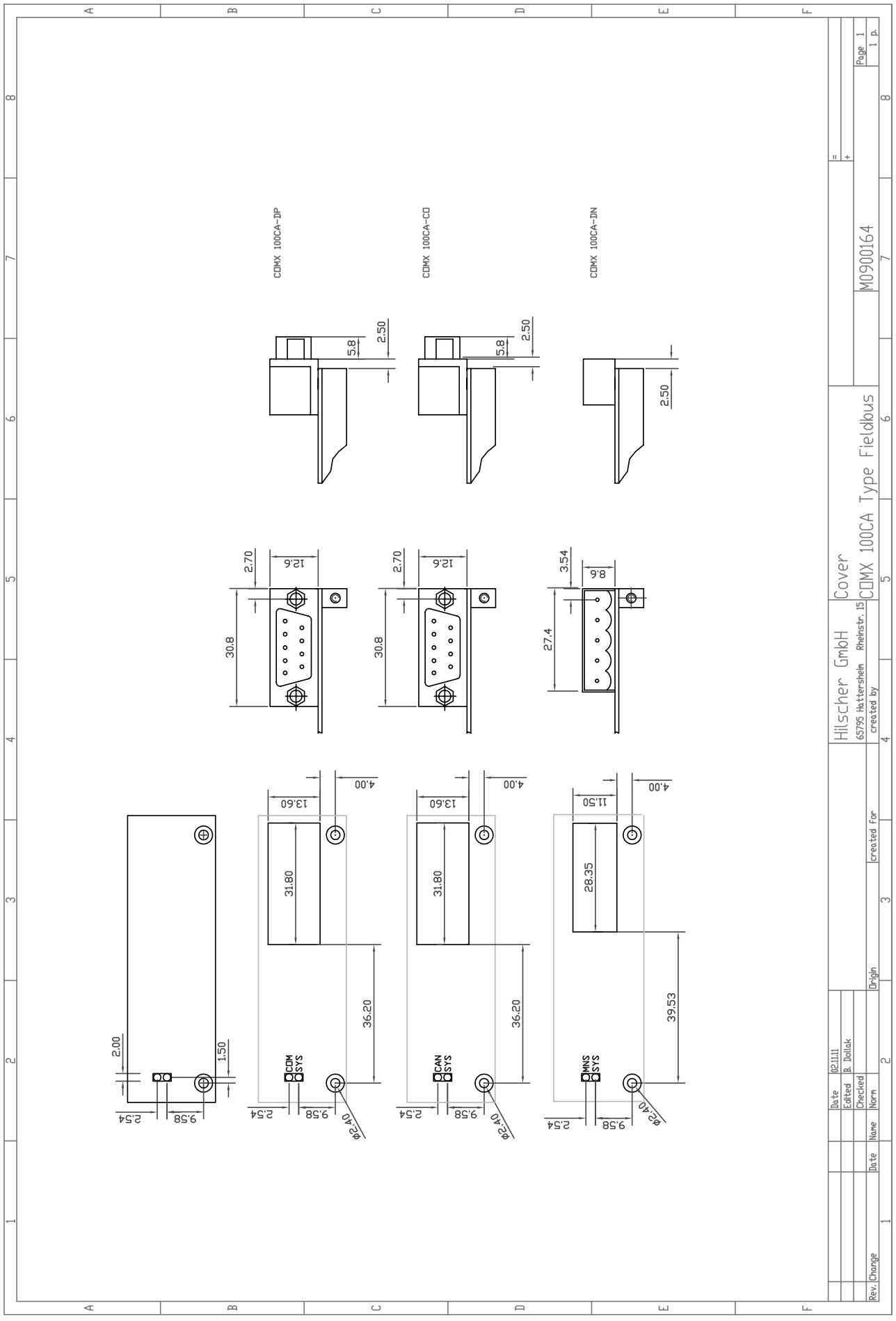


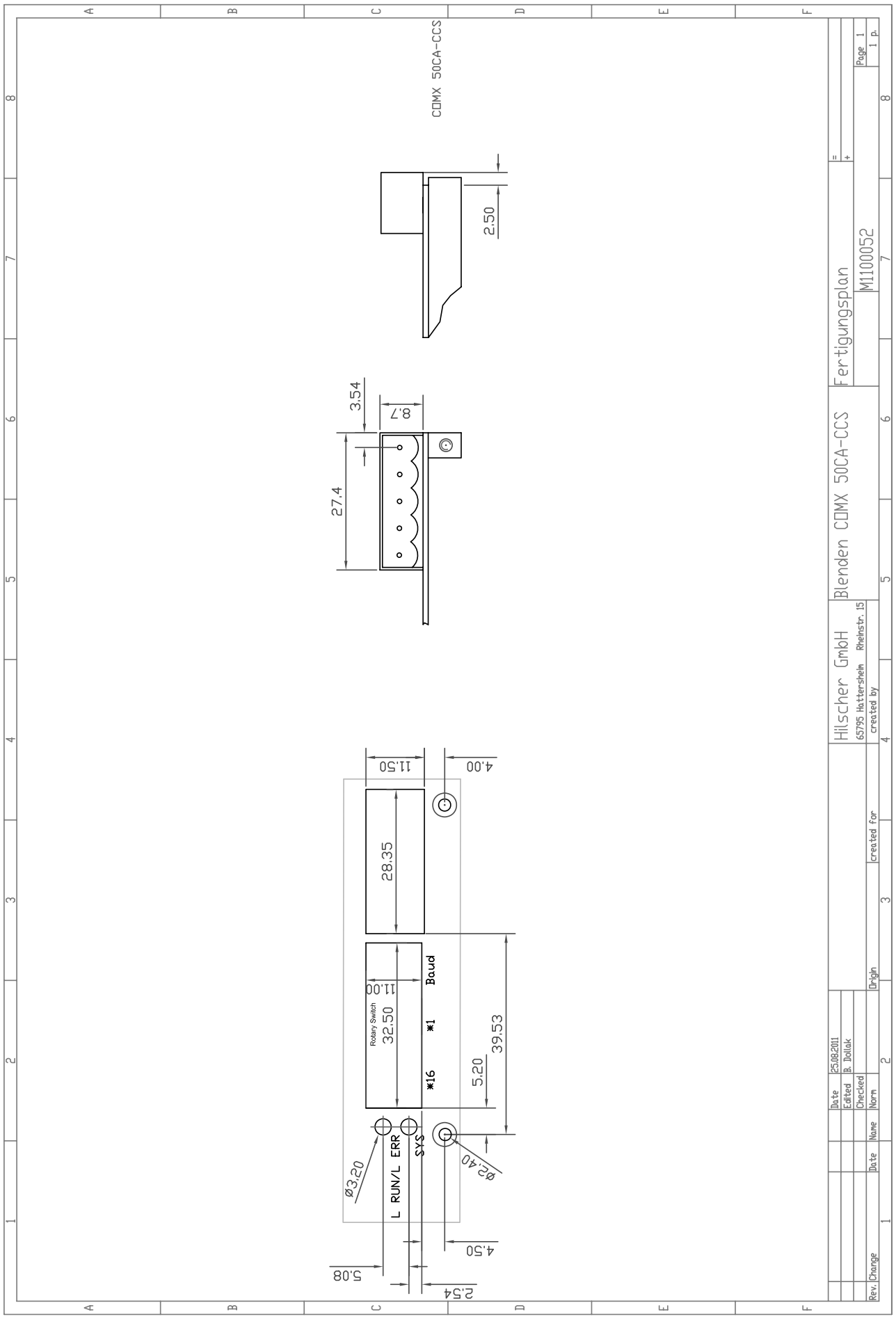












2.3 Type of Connector

The connector X1 for the host interface is a 50 pins SMT female type with a grid of 1.27 mm.

The COMX modules of the CN series have an additional fieldbus connector X2 with 30 pins of the same family.

The connector of the motherboard is the corresponding male type and can be ordered as follows:

In Germany

FJH die Steckverbinder GmbH
Hinter dem Turm 7
D-55286 Wörrstadt

Germany
Tel. +49 (0) 67 32 / 93 27 -0
Fax +49 (0) 67 32 / 93 27 -27

Web: www.fjh.de

Email: info@fjh.de

50 pin. Box header 127 KA - 050 SB
30 pin. Box header 127 KA - 030 SB

World Wide SAMTEC
www.samtec.com

		Cheaper version
50 pin. Connector	TFM - 125 - 02 - S - D – A	TFC - 125 - 02 - F - D – A
30 pin. Connector	TFM - 115 - 02 - S - D – A	TFC - 115 - 02 - F - D – A

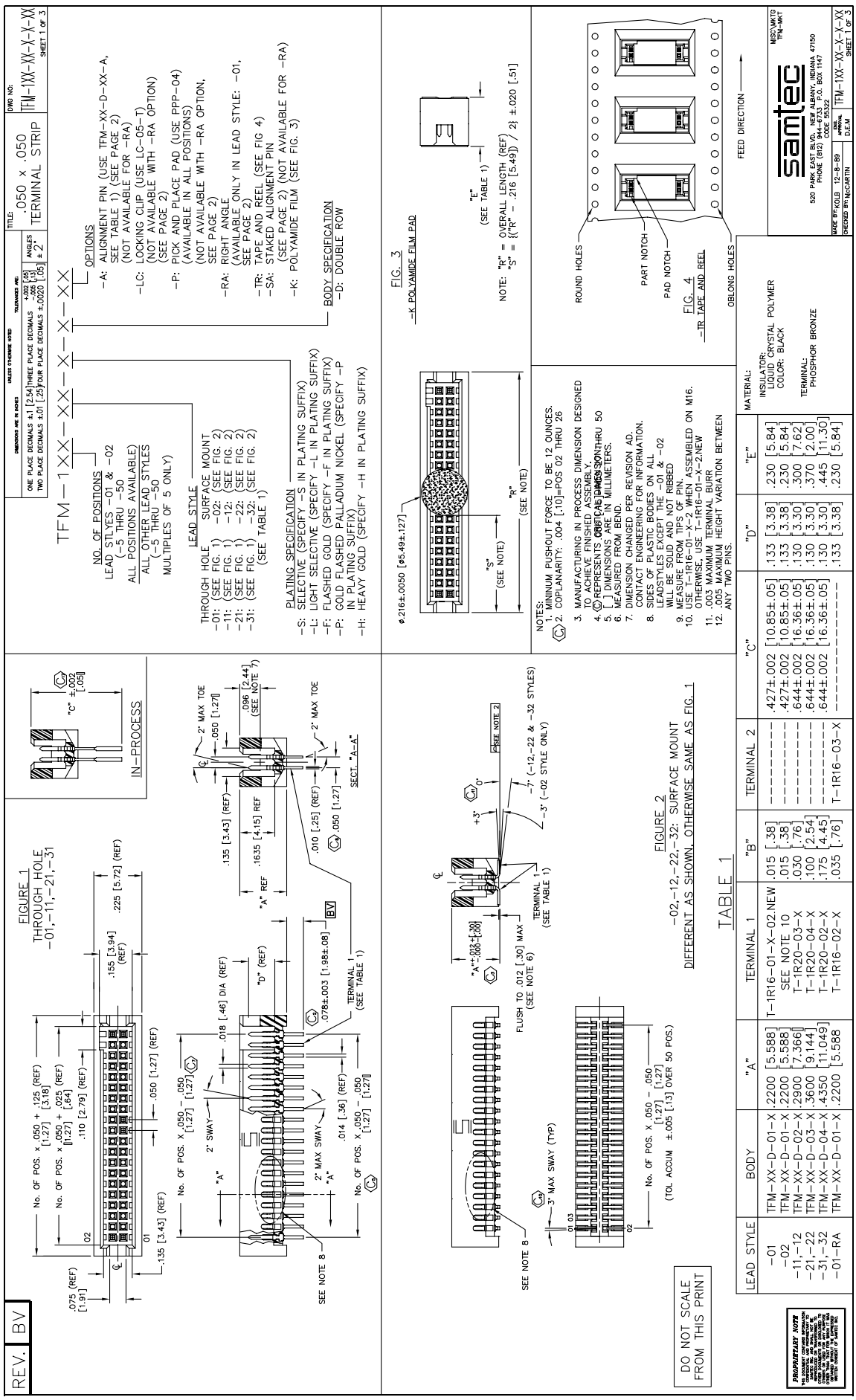
Note: Datasheet of SAMTEC TFM connector see next page.
Please notice that the polarization of X1 and X2 is opposite to Pin 1!

The fieldbus connector on the module is defined by the fieldbus standard as followed:

Fieldbus	Connector	Vendor
CANopen	9 pin, DSub, male	div. Vendor
DeviceNet	5 pin, COMBICON, male Grid 5.08 mm	i.e. PHOENIX Contact MSTBA2,5/5-5,08G-AU
Ethernet	8 pin, RJ45, female	div. Vendor
PROFIBUS	9 pin, DSub, female	div. Vendor
CC-Link	5 pin, COMBICON, male Grid 5.08 mm	i.e. PHOENIX Contact MSTBA2,5/5-G-AU

Table 8: Connector Types

Please use the same type of connector on the motherboard if you have chosen the COMX CN type module.



LEAD STYLE	BODY	"A"	TERMINAL 1	"B"	TERMINAL 2	"C"	"D"	"E"
-01	TFM-XX-D-01-X	.2200 [5.588]	T-1R16-01-X-02.NEW	.015 [.38]	----------	.427±.002 [10.85±.05]	.133 [3.38]	.230 [5.84]
-02	TFM-XX-D-01-X	.2200 [5.588]	SEE NOTE 10	.015 [.38]	----------	.427±.002 [10.85±.05]	.133 [3.38]	.230 [5.84]
-11,-12	TFM-XX-D-02-X	.2900 [7.366]	T-1R20-03-X	.030 [.76]	----------	.644±.002 [16.36±.05]	.130 [3.30]	.300 [7.62]
-21,-22	TFM-XX-D-03-X	.3600 [9.144]	T-1R20-04-X	.100 [2.54]	----------	.644±.002 [16.36±.05]	.130 [3.30]	.370 [2.00]
-31,-32	TFM-XX-D-04-X	.4350 [11.049]	T-1R20-02-X	.175 [4.45]	----------	.644±.002 [16.36±.05]	.130 [3.30]	.445 [11.30]
-01-RA	TFM-XX-D-01-X	.2200 [5.588]	T-1R16-02-X	.035 [.76]	T-1R16-03-X	----------	.133 [3.38]	.230 [5.84]

2.4 Mounting of COMX Modules

The COMX Module has two metal blocks for mounting. This guarantees a robust mechanical construction and a solid connection to earth ground for the fieldbus connector.

- The metal block close to the fieldbus connector must be connected to PE (= Protective Earth).
- The metal block close to the LEDs is not connected to the comX circuit and can be connected to PE, too.

The metal blocks also define the distance between the module and host board. They are connected together with M2.5 screws.

On the front side of the metal blocks there are a M2.5 thread to mount a front panel directly on the module. This allows to have the same cutting in the device housing for all types of Modules.

- Use fine technology that means six-mil-wide (150 µm) tracks

Note:	With this you have the possibility to get out between the pads. For the power tracks you can insert a via straight in the pad. To prevent a soldering problem please use a fine via (drill 0,2 mm).

- Place a via between board edge and connector pad

Note:	There is 1 mm space between the connector and the board edge, where you can place a 'normal' via (drill 0,3 mm) to feed the signals to the bottom side.

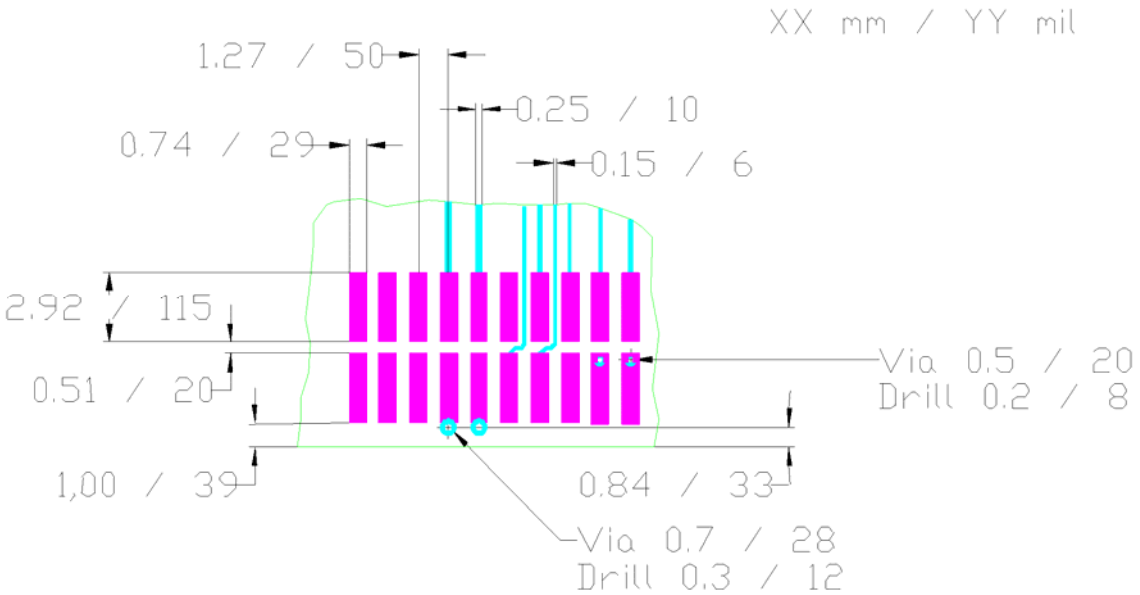


Figure 4: How to layout the Signals at the Connectors X1 and X2

Three types of metal bolts are used. The following table lists the usage for each COMX Module.

COM	Type	Left Side	Right Side
COMX 10CA	COS, DNS, DPS	COM-CA-B20X5	COM-CA-B24X5
	CCS	COM-CA-B20X5	COM-CA-B20X5
COMX 10CN	CCS, COS, DNS, DPS	COM-CA-B20X5	COM-CA-B20X5
COMX 50CA	CCS, REFO	COM-CA-B20X5	COM-CA-B20X5
COMX 100CA	CO, DN, DP, CC	COM-CA-B20X5	COM-CA-B24X5
	RE	COM-CA-B20X5	COM-CA-B31,5X5
COMX 100CN	COM, COS, DNM, DNS, DPM, DPS, RE	COM-CA-B20X5	COM-CA-B20X5

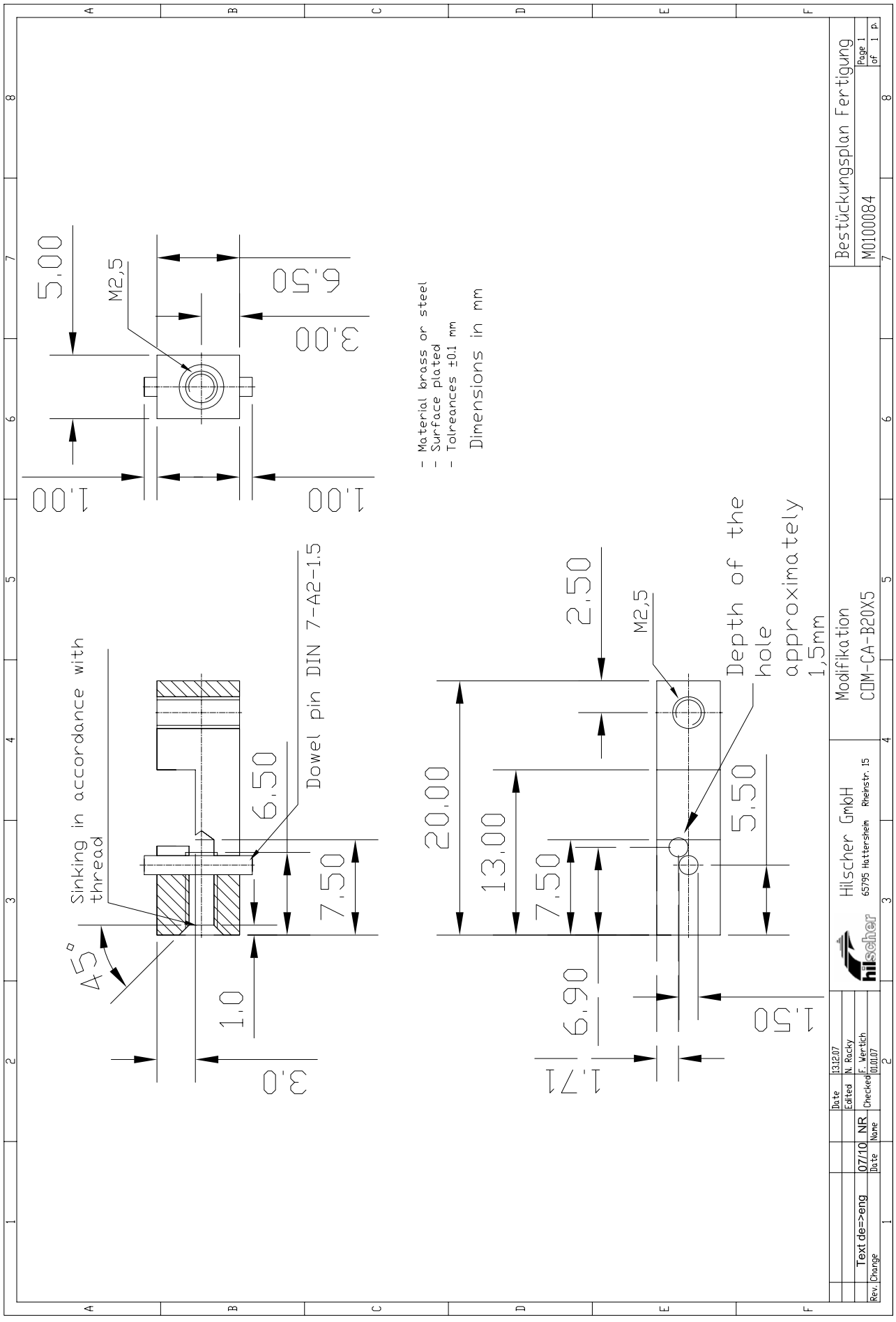
Table 9: Usage of Bolt for COMX Modules

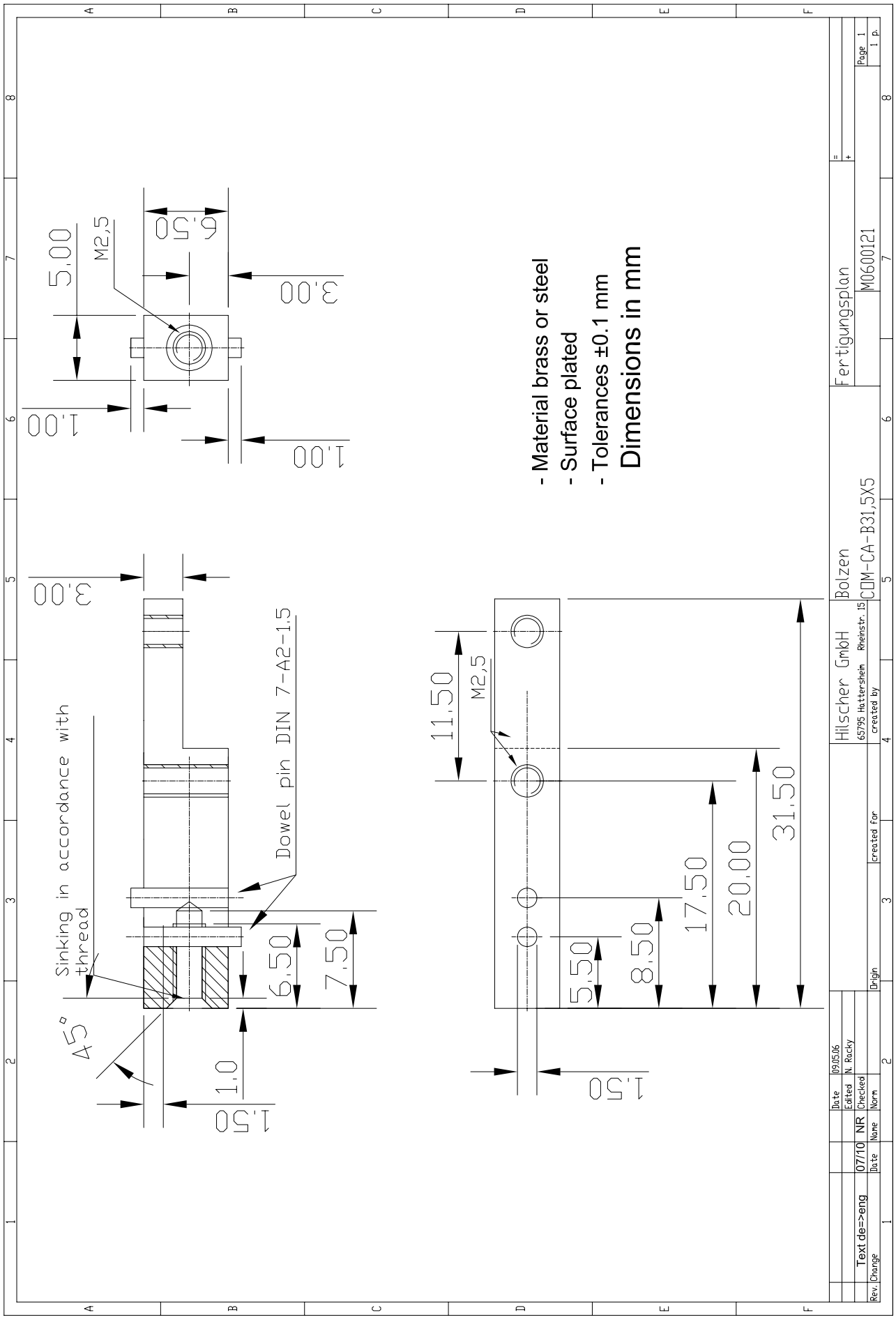
The drawings for the bolts are shown on the following drawings:

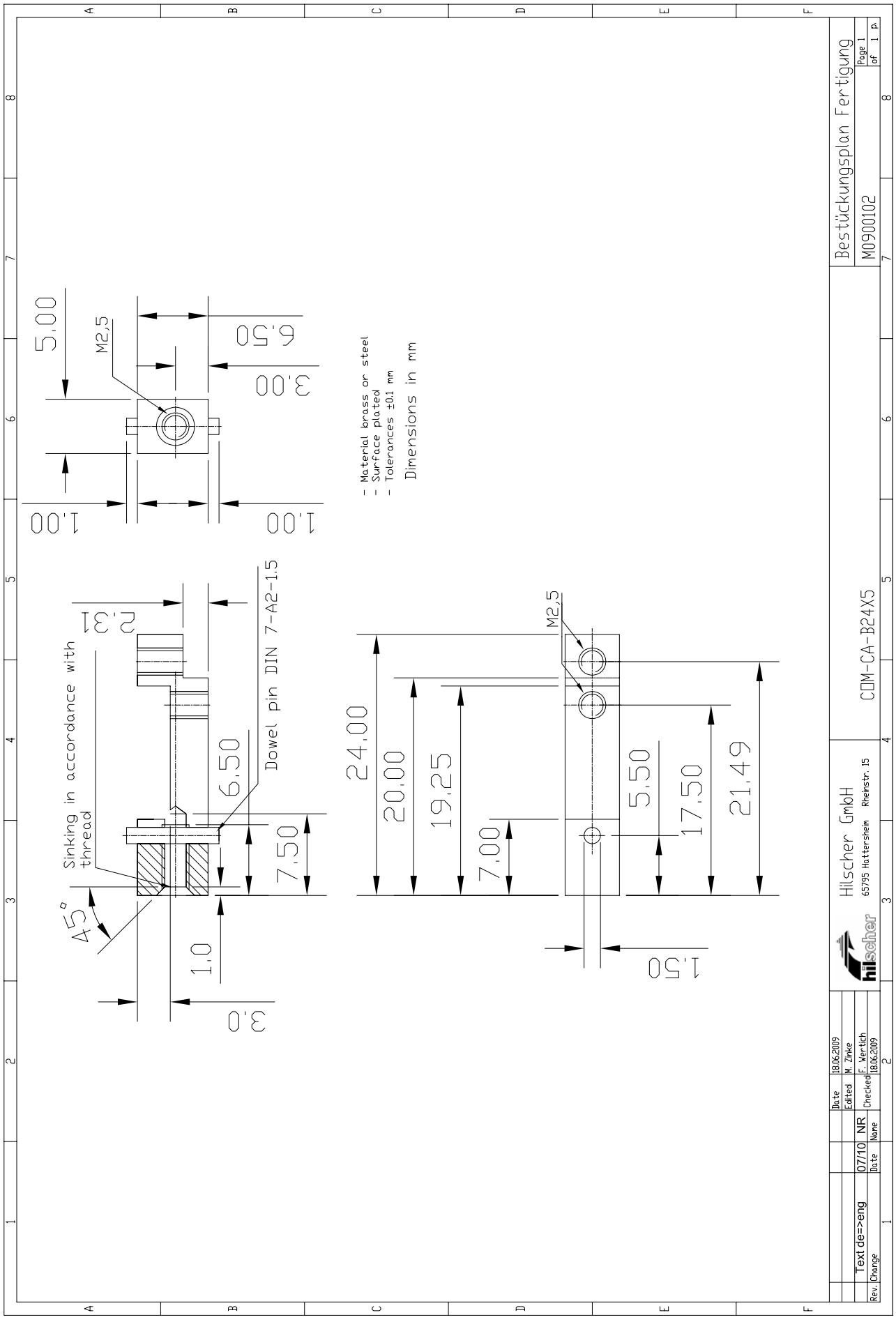
- M0100084 Mechanical dimension of Bolt COM-CA-B20X5
- M0600121 Mechanical dimension of Bolt COM-CA-B31,5X5
- M0900102 Mechanical dimension of Bolt COM-CA-B24X5

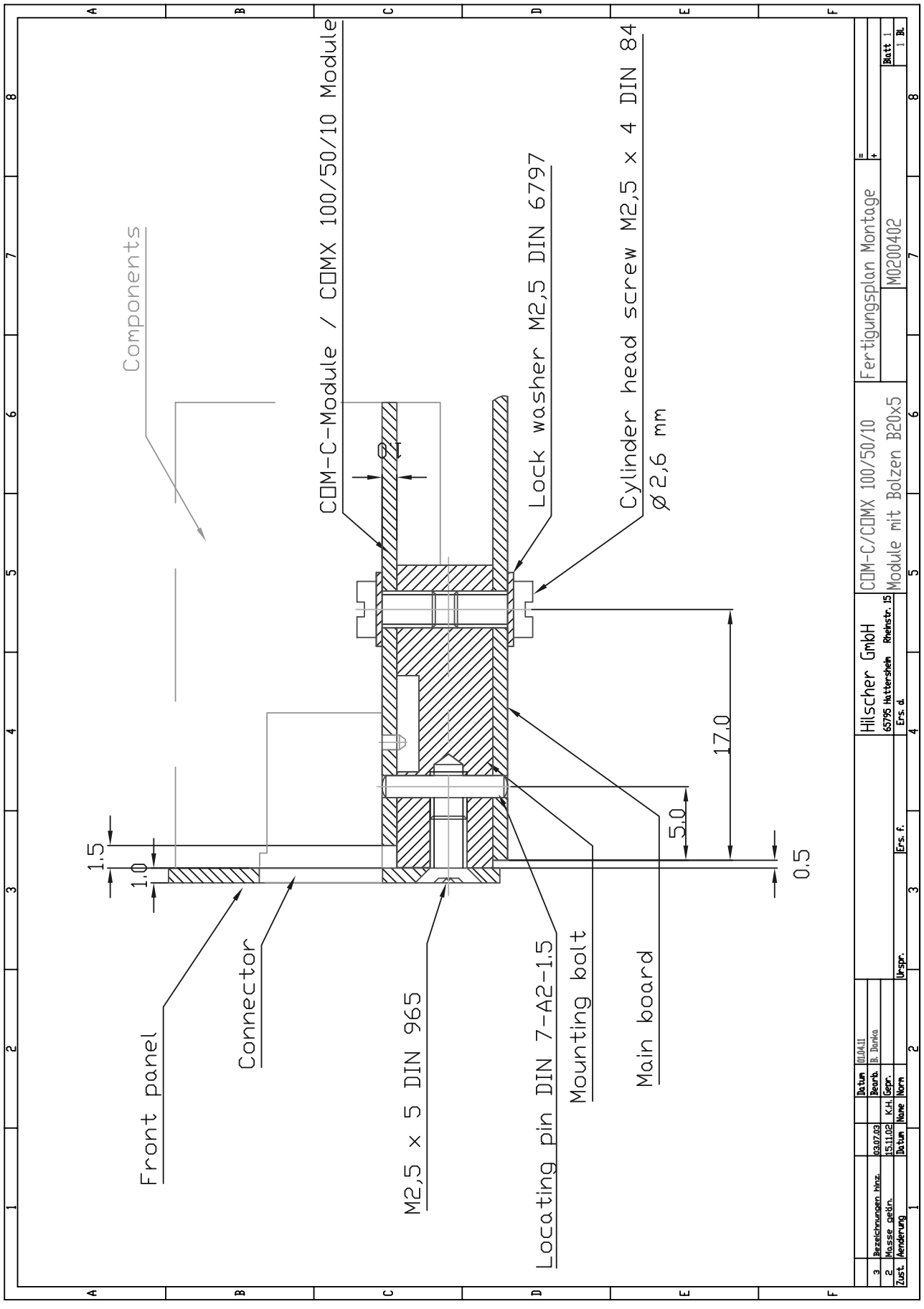
The drawing for an assembled bolt is shown on the following drawing:

- M0200402 Mechanical dimension how to assemble COM-CA-XXX on the mother board









2.5 Designation of the COMX Module

Each COMX Module has a matrix code label. A matrix label contains 3 items:

1. Part number/Order number
2. Hardware Revision
3. Serial number

The figure shows part number 1521.416, hardware revision 3 and serial number 00200.

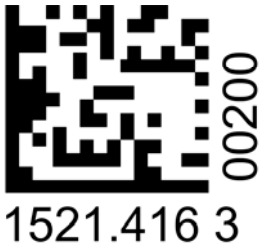


Figure 5: Example Matrix Code label of COMX Modules

The label is normally glued on top of the main processor.

2.6 Meaning of the Address Switch

2.6.1 PROFIBUS DP Slave

COMX 10CA-DPS and COMX 10CN-DPS

The following table shows the meaning of the address switch for COMX 10.

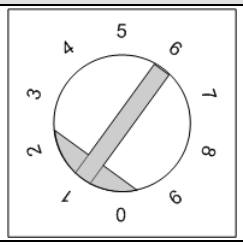
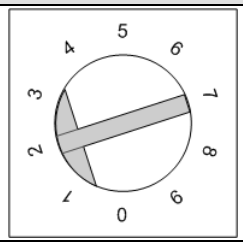
PROFIBUS DP Slave	**Station Address**	
		
Station address =	**Value * 10 +**	**Value * 1**
Value range for Station address: 0 … 99	0 … 9 = valid address	0 … 9 = valid address

Table 10: Meaning of the Address Switch of COMX 10CA-DPS and COMX 10CN-DPS

Example: For station address 12 set the left address switch to 1 and the right address switch to 2.

2.6.2 CANopen Slave

COMX 10CA-COS and COMX 10CN-COS

The following table shows the meaning of the address switch for COMX 10.

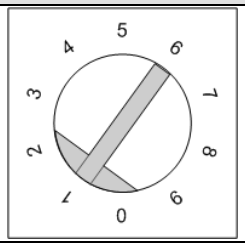
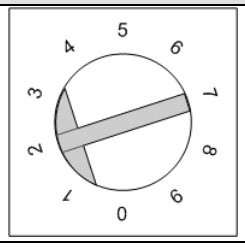
CANopen Slave	Node Address		
			
Node address =	**Value * 10**	**+**	**Value * 1**
Value range for node address: 0 … 99	0 … 9 = valid address		0 … 9 = valid address

Table 11: Meaning of the Address Switch of COMX 10CA-COS and COMX 10CN-CCS

Example: For node address 12 set the left address switch to 1 and the right address switch to 2.

2.6.3 DeviceNet Slave

COMX 10CA-DNS and COMX 10CN-DNS

The following table shows the meaning of the address switch for COMX 10.

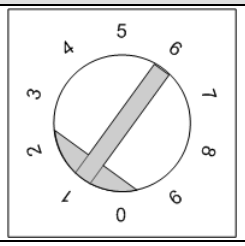
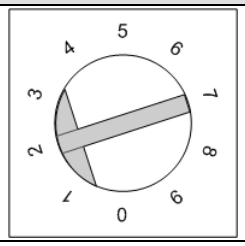
DeviceNet Slave	MAC ID		
			
MAC ID =	**Value * 10**	**+**	**Value * 1**
Value range for MAC ID: 0 … 63	0 … 6 = valid address 7, 8, 9 = invalid address, error		0 … 9 = valid address

Table 12: Meaning of the Address Switch of COMX 10CA-DNS and COMX 10CN-DNS

Example: For MAC ID 12 set the left address switch to 1 and the right address switch to 2.

2.6.4 CC-Link Slave

2.6.4.1 COMX 10CA-CCS and COMX 10CN-CCS

The following table shows the meaning of the address and baudrate switches for COMX 10.

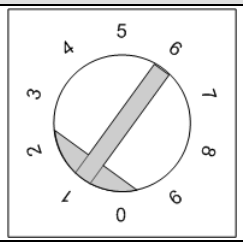
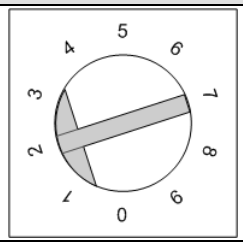
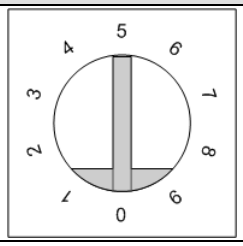
CC-Link Slave	Station Address		Baudrate
			
Station address =	**Value * 10 +**	**Value * 1**	
Value range for Station address: 1 … 64	0 … 6 = valid address 7, 8, 9 = invalid address, error	0, 1, …, 8, 9 = valid address	0 = 156 kBaud 1 = 625 kBaud 2 = 2,5 MBaud 3 = 5 MBaud 4 = 10 MBaud 5 ... 9 = Invalid, error

Table 13: Meaning of the Address and Baudrate Switch of COMX 10CA-CCS and COMX 10CN-CCS

Example: For station address 12 set the left switch to 1 and the middle switch to 2. For baudrate 156 kBaud set the right switch to 0.

Depending on the configuration parameter ‘Number of stations’, the value range for station address is:

Number of Stations	Value Range for Station Address
1	1 … 64
2	1 … 63
3	1 … 62
4	1 … 61

Table 14: Value Range for Station Address depending on Number of Stations

2.6.4.2 COMX 50CA-CCS

The following table shows the meaning of the address and baudrate switch for COMX 50.

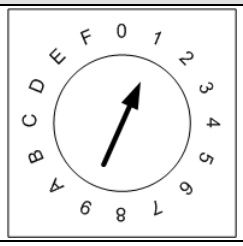
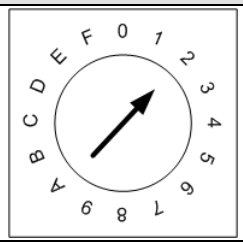
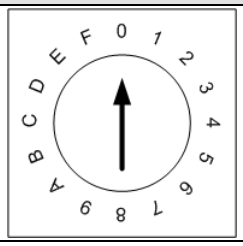
CC-Link Slave	Station Address		Baudrate
			
Station address =	**Value * 16 +**	**Value * 1**	
Value range for Station address: 1 … 64	0 … 4 = valid address 5, 6, 7, 8, 9, A … F = invalid address, error	0, 1, …, 8, 9, A, …, F = valid address	0 = 156 kBaud 1 = 625 kBaud 2 = 2,5 MBaud 3 = 5 MBaud 4 = 10 MBaud 5 ... F = Invalid, error

Table 15: Meaning of the Address and Baudrate Switch of COMX 50CA-CCS

Example: For CC-Link station address 18 set the left switch to 1 and the middle switch to 2. For baudrate 156 kBaud set the right switch to 0.

Depending on the configuration parameter ‘Number of stations’, the value range for station address is:

Number of Stations	Value Range for Station Address
1	1 … 64
2	1 … 63
3	1 … 62
4	1 … 61

Table 16: Value Range for Station Address depending on Number of Stations

The following table lists the settings for the CC-Link Station address:

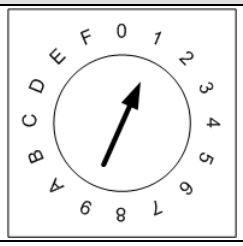
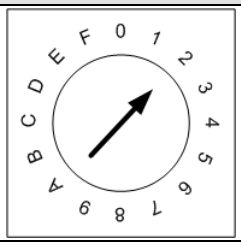
CC-Link Slave	Station Address		Remark
Value range for Station address: 1 … 64			
Station address =	**Value * 16 +**	**Value * 1**	
0	0	0	Invalid, Error
1	0	1	Valid
2	0	2	Valid
…	…	…	Valid
9	0	9	Valid
10	0	A	Valid
11	0	B	Valid
…	…	…	Valid
15	0	F	Valid
16	1	0	Valid
17	1	1	Valid
18	1	2	Valid
…	…	…	Valid
31	1	F	Valid
32	2	0	Valid
33	2	1	Valid
…	…	…	Valid
47	2	F	Valid
48	3	0	Valid
49	3	1	Valid
…	…	…	Valid
63	3	F	Valid
64	4	0	Valid
65	4	1	Invalid, Error
…	…	…	Invalid, Error
255	F	F	Invalid, Error

Table 17: Settings for CC-Link Slave Address with the Address Switch of COMX 50CA-CCS

3 Design-In - Electrical Aspects

3.1 Host Interface

Attention! All COMX modules have an operation voltage of 3.3 V which reduces the power consumption. Therefore the voltage levels of the signals have to be not higher than 3.3 V otherwise the module will be damaged.

The next sections show an overview of the signal pinning of the system connector.

3.1.1 Host Interface: Parallel or serial Dual-Port Memory Mode

3.1.1.1 COMX 50 and COMX 100

COMX 50 and COMX 100 Modules support one host interface mode: parallel dual-port memory mode.

How to set the 8 or 16 bit data with in parallel dual-port memory mode

The data width of the dual-port memory can be set to 8 or 16 bit. The data width is set at DPM_SIRQn during the start-up phase.

- A high signal at DPM_SIRQn sets the data width of 8 bit: pin is unconnected.
- A low signal at DPM_SIRQn sets the data width of 16 bit: 680 Ω pull-down resistor.

3.1.1.2 COMX 10

COMX 10 Modules support two host interface modes:

- parallel dual-port memory mode and the
- serial dual-port memory mode.

This can be configured by the level of the mode setting signal, which is evaluated during start-up phase of the module.

How to set the host interface mode

Parallel Dual-Port Memory Mode

- A high signal at DPM_DIRQn during start-up phase activates the dual-port memory mode.
- The data width of the dual-port memory can be set to 8 or 16 bit. The data width is set at DPM_SIRQn during the start-up phase.
  - A high signal at DPM_SIRQn sets the data width of 8 bit: pin is unconnected.
  - A low signal at DPM_SIRQn sets the data width of 16 bit: 680 Ω pull-down resistor.

Serial Dual-Port Memory Mode

- A low signal at DPM_DIRQn activates the serial dual-port memory mode (via a 680 Ω pull-down resistor). Pin DPM_SIRQn: let the input open.

Signals DPM_DIRQn and DPM_SIRQn have a pull-up resistor of 4,7 kΩ on the COMX 10 Module.

Important: Never drive the host interface mode signal (DPM_DIRQn). Instead, operation with pull-down and pull-up resistors is recommended.

3.1.2 COMX Pinning of the System Bus Connector X1 – Parallel Mode

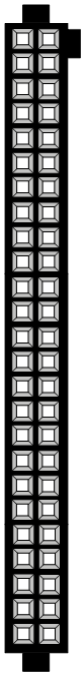
X1	Pin	Signal	COMX 10 PAD Type	COMX 50 PAD Type	COMX 100 PAD Type	Symbol	Type
	1	Word Interface, active low	IOU6	IOU9	IO18C	DPM_SIRQn	LVTTL Input
	2	Bus high enable, active low	IOU6	IOU9	IO18C	DPM_BHEn	LVTTL Input
	3	Data line 15	IOD6	IOU9	IO18C	DPM_D15	LVTTL Input / Output
	4	Data line 14	IOD6	IOU9	IO18C	DPM_D14	LVTTL Input / Output
	5	Data line 13	IOD6	IOU9	IO18C	DPM_D13	LVTTL Input / Output
	6	Data line 12	IOD6	IOU9	IO18C	DPM_D12	LVTTL Input / Output
	7	Data line 11	IOD6	IOU9	IO18C	DPM_D11	LVTTL Input / Output
	8	Data line 10	IOD6	IOU9	IO18C	DPM_D10	LVTTL Input / Output
	9	Data line 9	IOD6	IOU9	IO18C	DPM_D9	LVTTL Input / Output
	10	Data line 8	IOD6	IOU9	IO18C	DPM_D8	LVTTL Input / Output
	11	Ground				GND	
	12	Power Supply				+3V3	
	13	Transmit Data, Serial line	IOUS6	IODS6	IOD6	UART1_TXD	LVTTL Output
	14	Receive Data, Serial line	IOUS6	IODS6	IOD6	UART1_RXD	LVTTL Input
	15	Request to Send, Serial line & SYNC0	IOUS6	IODS6	IOD6	UART1_RTSn / SYNC0	LVTTL Output / SYNC Input / Output Signal XC3_IO0 (Note 1, 2)
	16	Clear to Send, Serial line & SYNC1	IOUS6	IODS6	IOD6	UART1_CTSn / SYNC1	LVTTL Input / SYNC Input / Output Signal XC3_IO1 (Note 1, 2)
	17	USB positive, Diagnostic line	USB	USB	USB	USB+	USB
	18	USB negative, Diagnostic line	USB	USB	USB	USB-	USB
	19	Receive Data, Diagnostic line	IOUS6	IODS6	IOD6	UART0_RXD	LVTTL Input
	20	Transmit Data, Diagnostic line	IOUS6	IODS6	IOD6	UART0_TXD	LVTTL Output
	21	Reset, active low	IUS	IUS	IO18C	DPM_RESETn	LVTTL Input; 10 kΩ pull up at COMX
	22	Busy, active low	IOU6	IOU9	IO18C	DPM_BUSYn	LVTTL Output
	23	During operation: Interrupt, active low COMX 10 at start-up: Host mode selection	IOU6	IOU9	IO18C	DPM_DIRQn	During operation: LVTTL Output At start-up: LVTTL Input
	24	Read, active low	IOU6	IOU9	IO18C	DPM_RDn	LVTTL Input
	25	Write, active low	IOU6	IOU9	IO18C	DPM_WRn	LVTTL Input
	26	Chip select, active low	IOU6	IOU9	IO18C	DPM_CSn	LVTTL Input

Table 18: COMX Pinning of the System Bus Connector X1- Parallel DPM Mode (Part 1)

X1	Pin	Signal	COMX 10 PAD Type	COMX 50 PAD Type	COMX 100 PAD Type	Symbol	Type
	27	Address line 13	IOD6	IOU9	IO18C	DPM_A13	LVTTL Input
	28	Address line 12	IOD6	IOU9	IO18C	DPM_A12	LVTTL Input
	29	Address line 11	IOD6	IOU9	IO18C	DPM_A11	LVTTL Input
	30	Address line 10	IOD6	IOU9	IO18C	DPM_A10	LVTTL Input
	31	Address line 9	IOD6	IOU9	IO18C	DPM_A9	LVTTL Input
	32	Address line 8	IOD6	IOU9	IO18C	DPM_A8	LVTTL Input
	33	Address line 7	IOD6	IOU9	IO18C	DPM_A7	LVTTL Input
	34	Address line 6	IOD6	IOU9	IO18C	DPM_A6	LVTTL Input
	35	Address line 5	IOD6	IOU9	IO18C	DPM_A5	LVTTL Input
	36	Address line 4	IOD6	IOU9	IO18C	DPM_A4	LVTTL Input
	37	Address line 3	IOD6	IOU9	IO18C	DPM_A3	LVTTL Input
	38	Address line 2	IOD6	IOU9	IO18C	DPM_A2	LVTTL Input
	39	Address line 1	IOD6	IOU9	IO18C	DPM_A1	LVTTL Input
	40	Address line 0	IOD6	IOU9	IO18C	DPM_A0	LVTTL Input
	41	Data line 7	IOD6	IOU9	IO18C	DPM_D7	LVTTL Input / Output
	42	Data line 6	IOD6	IOU9	IO18C	DPM_D6	LVTTL Input / Output
	43	Data line 5	IOD6	IOU9	IO18C	DPM_D5	LVTTL Input / Output
	44	Data line 4	IOD6	IOU9	IO18C	DPM_D4	LVTTL Input / Output
	45	Data line 3	IOD6	IOU9	IO18C	DPM_D3	LVTTL Input / Output
	46	Data line 2	IOD6	IOU9	IO18C	DPM_D2	LVTTL Input / Output
	47	Data line 1	IOD6	IOU9	IO18C	DPM_D1	LVTTL Input / Output
	48	Data line 0	IOD6	IOU9	IO18C	DPM_D0	LVTTL Input / Output
	49	Ground				GND	
	50	Power Supply				+3V3	

Table 19: COMX Pinning of the System Bus Connector X1 – Parallel DPM Mode (Part 2)

Note	Information
1	Support of SYNC signals depends on the functionality of the used firmware. See *Table 39: Meaning of the SYNC Signals for each Protocol* on page 63 for details.
2	SYNC0 and SYNC1 are available on COMX 100CA-RE and COMX 100CN-RE only. SYNC0 is shared with UART1_RTSn and SYNC1 is shared with UART1_CTSn.

Table 20: Notes for COMX Pinning of the System Bus Connector X1

3.1.3 COMX Pinning of the System Bus Connector X1 – Serial Mode

The following table is valid for COMX 10 Modules only and if the serial dual-port memory mode is active.

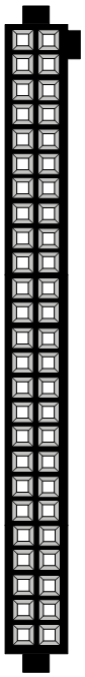
X1	Pin	Signal	COMX 10 PAD Type	Symbol	Type
	1	reserved	IOU6	reserved	Note 3
	2	reserved	IOU6	reserved	Note 3
	3	reserved	IOD6	reserved	Note 3
	4	reserved	IOD6	reserved	Note 3
	5	reserved	IOD6	SPM_SIRQn	LVTTL Output, Note 4
	6	reserved	IOD6	SPM_DIRQn	LVTTL Output, Note 4
	7	Clock	IOD6	SPM_CLK	LVTTL Input
	8	Chip select, active low	IOD6	SPM_CSn	LVTTL Input
	9	Master Out Slave In	IOD6	SPM_MOSI	LVTTL Input
	10	Master In Slave Out	IOD6	SPM_MISO	LVTTL Output
	11	Ground		GND	
	12	Power Supply		+3V3	
	13	Transmit Data, Serial line	IOUS6	UART1_TXD	LVTTL Output
	14	Receive Data, Serial line	IOUS6	UART1_RXD	LVTTL Input
	15	Request to Send, Serial line & SYNC0	IOUS6	UART1_RTSn / SYNC0	LVTTL Output / SYNC Output Signal XC3_IO0 (Note 1, 2)
	16	Clear to Send, Serial line & SYNC1	IOUS6	UART1_CTSn / SYNC1	LVTTL Input / SYNC Output Signal XC3_IO1 (Note 1, 2)
	17	USB positive, Diagnostic line	USB	USB+	USB
	18	USB negative, Diagnostic line	USB	USB-	USB
	19	Receive Data, Diagnostic line	IOUS6	UART0_RXD	LVTTL Input
	20	Transmit Data, Diagnostic line	IOUS6	UART0_TXD	LVTTL Output
	21	Reset, active low	IUS	DPM_RESETn	LVTTL Input; 10 kΩ pull up
	22	reserved	IOU6	reserved	Note 3
	23	COMX 10 at start-up: Host mode selection	IOU6	DPM_DIRQn	At start-up: LVTTL Input
	24	reserved	IOU6	reserved	Note 3
	25	reserved	IOU6	reserved	Note 3
	26	reserved	IOU6	reserved	Note 3

Table 21: COMX Pinning of the System Bus Connector X1- Serial DPM Mode COMX 10 (Part 1)

X1	Pin	Signal	COMX 10 PAD Type	Symbol	Type
	27	reserved	IOD6	reserved	Note 3
	28	reserved	IOD6	reserved	Note 3
	29	reserved	IOD6	reserved	Note 3
	30	reserved	IOD6	reserved	Note 3
	31	reserved	IOD6	reserved	Note 3
	32	reserved	IOD6	reserved	Note 3
	33	reserved	IOD6	reserved	Note 3
	34	reserved	IOD6	reserved	Note 3
	35	reserved	IOD6	reserved	Note 3
	36	reserved	IOD6	reserved	Note 3
	37	reserved	IOD6	reserved	Note 3
	38	reserved	IOD6	reserved	Note 3
	39	reserved	IOD6	reserved	Note 3
	40	reserved	IOD6	reserved	Note 3
	41	reserved	IOD6	reserved	Note 3
	42	reserved	IOD6	reserved	Note 3
	43	reserved	IOD6	reserved	Note 3
	44	reserved	IOD6	reserved	Note 3
	45	reserved	IOD6	reserved	Note 3
	46	reserved	IOD6	reserved	Note 3
	47	reserved	IOD6	reserved	Note 3
	48	reserved	IOD6	reserved	Note 3
	49	Ground		GND	
	50	Power Supply		+3V3	

Table 22: COMX Pinning of the System Bus Connector X1 – Serial DPM Mode COMX 10 (Part 2)

Note	Information
1	Support of SYNC signals depends on the functionality of the used firmware. See *Table 39: Meaning of the SYNC Signals for each Protocol* on page 63 for details.
2	SYNC0 and SYNC1 are available on COMX 100CA-RE and COMX 100CN-RE only. SYNC0 is shared with UART1_RTSn and SYNC1 is shared with UART1_CTSn.
3	External wiring: Pin unconnected
4	Not supported

Table 23: Notes for COMX Pinning of the System Bus Connector X1

3.1.4 PAD Type Explanation

Symbol	Description
I	Input
O	Output
Z	Output is tri-state-able or open drain
S	Input provides Schmitt trigger
U	Internal pull-up 50 k (I2C pins: pull-up 5k)
D	Internal pull-down 50 k
C	Internal clamping diodes to GND and VDDh
6	Output driver can source / sink 6 mA
9	Output driver can source / sink 9 mA
18	Output driver can source / sink 18 mA
XTAL	Crystal input or output

Symbol	Description
USB	USB pad
PHY	PHY pad
ANA	Analog pin
PWR	1.5V (Core) or 3.3V /I/O)
GND	Digital ground (0V)
APWR	Analog power (1.5V or 3.3V)
AGND	Analog ground (0V)

Table 24: PAD Type Explanation

Schematic View of netX Pad Types

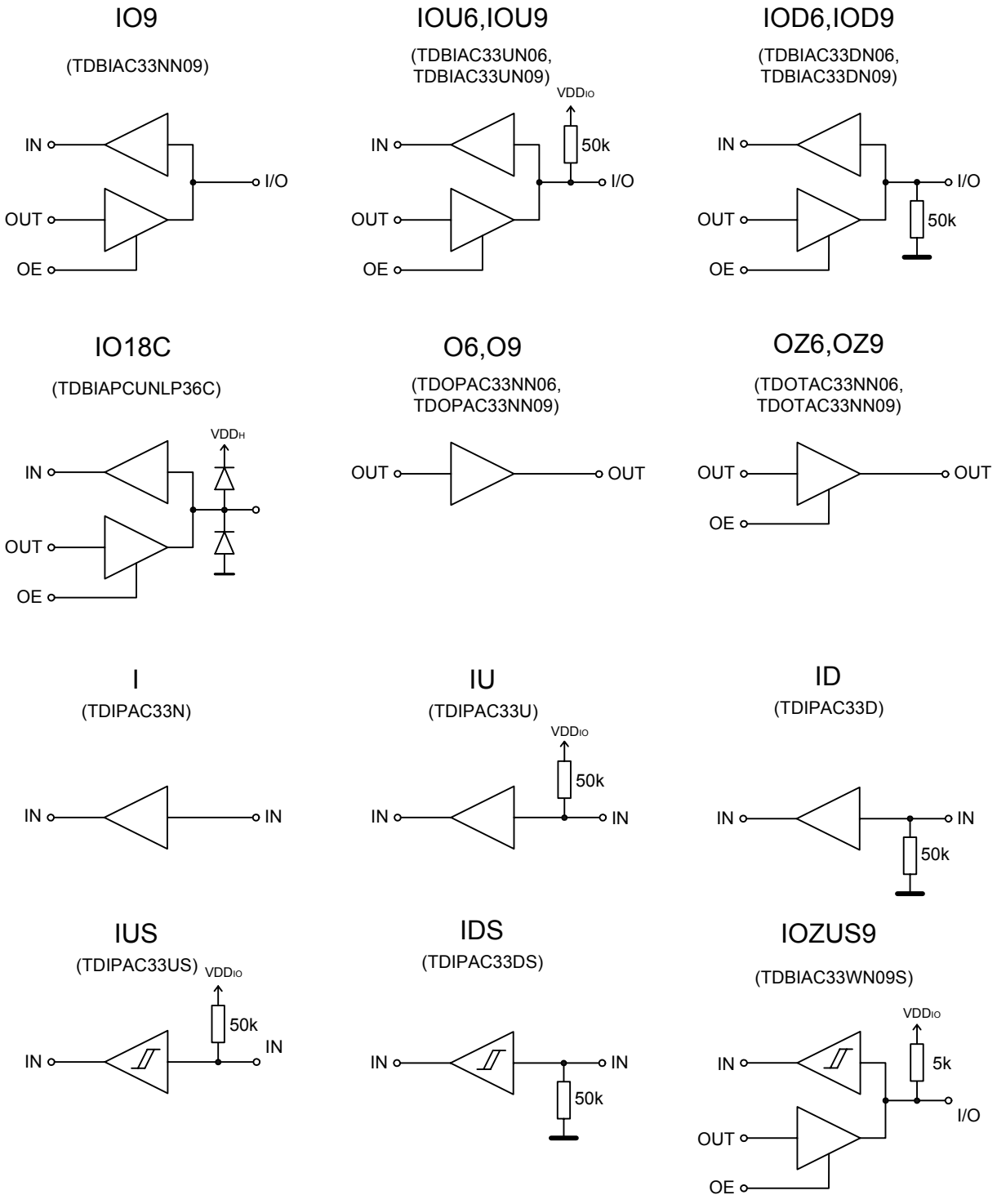


Figure 6: Schematic View of netX Pad Types

3.1.5 Signal Overview and Pinning of the Fieldbus Connector X2 on COMX CN

3.1.5.1 Fieldbus Connector X2 for CC-Link Slave

Fieldbus connector X2 for COMX 10CN-CCS

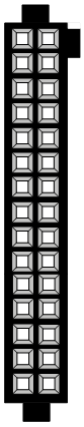
X2	Pin	Signal	Symbol	Type	Pin at Fieldbus Connector COMBICON 5pin
	1				
	2	*Receive Driver Enable*	*RDENn*	*6 mA Output*	*Note 1*
	3				
	4	*CC-Link, Transmission period signal*	*SDGATEON*	*6 mA Output*	*Note 1*
	5				
	6	*CC-Link, Transmission Data*	*SD*	*6 mA Output*	*Note 1*
	7				
	8	*CC-Link, Received Data (channel 1)*	*RD1*	*TTL Input*	*Note 1*
	9				
	10				
	11				
	12				
	13	L RUN-LED, STA, Cathode green LED	STAn	6 mA Output	
	14	SYS-LED, RUN, Cathode green LED	RUNn	6 mA Output	
	15	L ERR-LED, ERR, Cathode red LED	ERRn	6 mA Output	
	16	SYS-LED, RDY, Cathode yellow LED	RDYn	6 mA Output	
	17	Ground	GND		
	18	Power Supply	+3.3 V		
	19	Peripheral IO	PIO	LVTTL Input / Output	
	20	Don't use - needed for isolation			
	21	Don't use - needed for isolation			
	22				
	23				
	24				
	25				
	26	CC-Link, Data A	DA		1
	27	CC-Link, Data B	DB		2
	28	CC-Link, Data Ground	DG		3
	29	CC-Link, Function Ground	FG		5
	30	CC-Link, Shield	SLD		4

Table 25: Fieldbus Connector X2 for CC-Link Slave

Note	Information
1	LVTTL Signals can only be used without the hardware interface on the COMX. Ask for special customer version.

Table 26: Notes for Fieldbus Connector X2 for CC-Link Slave

3.1.5.2 Fieldbus Connector X2 for CANopen-Master/-Slave

Fieldbus connector X2 for COMX 10CN-COS and COMX 100CN-CO

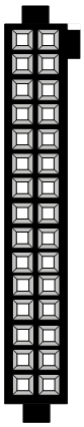
X2	Pin	Signal	Symbol	Type	Pin at Fieldbus Connector DSub 9, male
	1				
	2				
	3				
	4				
	5				
	6				
	7	*CAN, Receive Data*	*CAN_RX1*	*LVTTL Input*	*Note 1*
	8				
	9	*CAN, Transmit Data*	*CAN_TX1*	*LVTTL Output*	*Note 1*
	10				
	11				
	12				
	13	COM-LED, STA, Cathode green LED	STAn	4 mA Output	*Note 2*
	14	SYS-LED, RUN, Cathode green LED	RUNn	4 mA Output	
	15	COM-LED, ERR, Cathode red LED	ERRn	4 mA Output	
	16	SYS-LED, RDY, Cathode yellow LED	RDYn	4 mA Output	
	17	Ground	GND		
	18	Power Supply	+3.3 V		
	19	Peripheral IO	PIO	LVTTL Input / Output	
	20	Don't use - needed for isolation			
	21	Don't use - needed for isolation			
	22				
	23	CAN_H Bus line	CAN_H	ISO 11898	7
	24				
	25				
	26	CAN Ground	CAN_GND		3
	27				
	28				
	29	CAN_L Bus line	CAN_L	ISO 11898	2
	30				

Table 27: Fieldbus Connector X2 for CANopen-Master/-Slave

Note	Information
1	LVTTL Signals can only be used without the hardware interface on the COMX. Ask for special customer version.
2	Green LED for COMX 100CN-CO

Table 28: Notes for Fieldbus Connector X2 for CANopen-Master/-Slave

3.1.5.3 Fieldbus Connector X2 for DeviceNet-Master/-Slave

Fieldbus connector X2 for COMX 10CN-DNS and COMX 100CN-DN

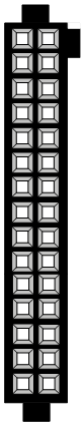
X2	Pin	Signal	Symbol	Type	Pin at Fieldbus connector COMBICON 5pin
	1				
	2				
	3				
	4				
	5				
	6				
	7	*CAN, Receive Data*	*CAN_RX1*	*LVTTL Input*	*Note 1*
	8				
	9	*CAN, Transmit Data*	*CAN_TX1*	*LVTTL Output*	*Note 1*
	10				
	11	*CAN, Power Fail*	*CAN_PF1*	*LVTTL Input*	*Note 1*
	12				
	13	MNS-LED, active low, Cathode green LED	MNS_CGn	4 mA Output	
	14	RUN-LED, RUN, Cathode green LED	RUNn	4 mA Output	
	15	MNS-LED, active low, Cathode red LED	MNS_CRn	4 mA Output	
	16	SYS-LED, RDY, Cathode yellow LED	RDYn	4 mA Output	
	17	Ground	GND		
	18	Power Supply	+3.3 V		
	19	Peripheral IO	PIO	LVTTL Input / Output	
	20	Don't use - needed for isolation			
	21	Don't use - needed for isolation			
	22				
	23				
	24				
	25				
	26	Reference potential DeviceNet	V-		1
	27	CAN Low-Signal	CAN_L		2
	28	Shield	Drain		3
	29	CAN High-Signal	CAN_H		4
	30	+24V Power Supply DeviceNet	V+		5

Table 29: Fieldbus Connector X2 for DeviceNet-Master/-Slave

Note	Information
1	LVTTL Signals can only be used without the hardware interface on the COMX. Ask for special customer version.

Table 30: Notes for Fieldbus Connector X2 for DeviceNet-Master/-Slave

3.1.5.4 Fieldbus Connector X2 for PROFIBUS-Master/-Slave

Fieldbus connector X2 for COMX 10CN-DPS and COMX 100CN-DP

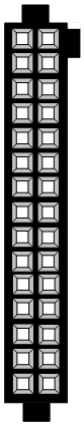
X2	Pin	Signal	Symbol	Type	Pin at Fieldbus connector DSub-9, female
	1	*PROFIBUS, Receive Data*	*PB_RX*	*LVTTL Input*	*Note 1*
	2				
	3	*PROFIBUS, Transmit Data*	*PB_TX*	*LVTTL Output*	*Note 1*
	4				
	5	*PROFIBUS, Enable Bus Driver*	*PB_ENB*	*LVTTL Output*	*Note 1*
	6				
	7				
	8				
	9				
	10				
	11				
	12				
	13	COM-LED, STA, Cathode green LED (COMX)	STAn	4 mA Output	*Note 2*
	14	SYS-LED, RUN, Cathode green LED	RUNn	4 mA Output	
	15	COM-LED, ERR, Cathode red LED	ERRn	4 mA Output	
	16	SYS-LED, RDY, Cathode yellow LED	RDYn	4 mA Output	
	17	Ground	GND		
	18	Power Supply	+3.3 V		
	19	Peripheral IO	PIO	LVTTL Input / Output	
	20	Don't use - needed for isolation			
	21	Don't use - needed for isolation			
	22	Reference potential	DGND		5
	23	Control	CNTR-P	LVTTL	4
	24				
	25	Receive / Send Data-N	RXD/TXD-N	RS 485	8
	26	Receive / Send Data-P	RXD/TXD-P	RS 485	3
	27				
	28				
	29	Positive power supply	VP	+ 5V	6
	30				

Table 31: Fieldbus Connector X2 for PROFIBUS-Master/-Slave

Note	Information
1	LVTTL Signals can only be used without the hardware interface on the COMX. Ask for special customer version.
2	Green LED for COMX 100CN-DP

Table 32: Notes for Fieldbus Connector X2 for PROFIBUS-Master/-Slave

3.1.5.5 Fieldbus Connector X2 for Real Time Ethernet

Fieldbus connector X2 for COMX 100CN-RE

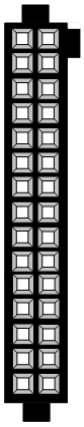
X2	Pin	Signal	Symbol	Type	Pin at Fieldbus connector RJ45
	1	Link0-LED Cathode green, active low	LINK0_CGn	4 mA Output	
	2	TX/RX0-LED Cathode yellow, active low	TX/RX0_CYn	4 mA Output	
	3	Link1-LED Cathode green, active low	LINK1_CGn	4 mA Output	
	4	TX/RX1-LED Cathode yellow, active low	TX/RX1_CYn	4 mA Output	
	5	Transmit Data Positive Channel 0	CH0_TXP		1A
	6	Transmit Data Negative Channel 0	CH0_TXN		2A
	7	Transmit Center Tap Channel 0	CH0_TXC		4A
	8	Ground	GND		
	9	Receive Data Positive Channel 0	CH0_RXP		3A
	10	Receive Data Negative Channel 0	CH0_RXN		6A
	11	Receive Center Tap Channel 0	CH0_RXC		5A
	12	Ground	GND		
	13	Transmit Data Positive Channel 1	CH1_TXP		1B
	14	Transmit Data Negative Channel 1	CH1_TXN		2B
	15	Transmit Center Tap Channel 1	CH1_TXC		4B
	16	Ground	GND		
	17	Receive Data Positive Channel 1	CH1_RXP		3B
	18	Receive Data Negative Channel 1	CH1_RXN		6B
	19	Receive Center Tap Channel 1	CH1_RXC		5B
	20	Ground	GND		
	21	COM0-LED Cathode red, active low	COM0_CRn	4 mA Output	
	22	COM0-LED Cathode green, active low	COM0_CGn	4 mA Output	
	23	COM1-LED Cathode red, active low	COM1_CRn	4 mA Output	
	24	COM1-LED Cathode green, active low	COM1_CGn	4 mA Output	
	25	SYS-LED, RDY, Cathode yellow LED	RDYn	4 mA Output	
	26	SYS-LED, RUN, Cathode green LED	RUNn	4 mA Output	
	27	Peripheral IO	PIO	LVTTL Input / Output	
	28	not connected			
	29	not connected			
	30	not connected			

Table 33: Fieldbus Connector X2 for Real Time Ethernet

The Pin layout is designed to fit for a RJ45 connector with integrated transformers, LEDs and termination. Suggested part:

- 203313, ERNI or
- J0864D628ANL, Pulse

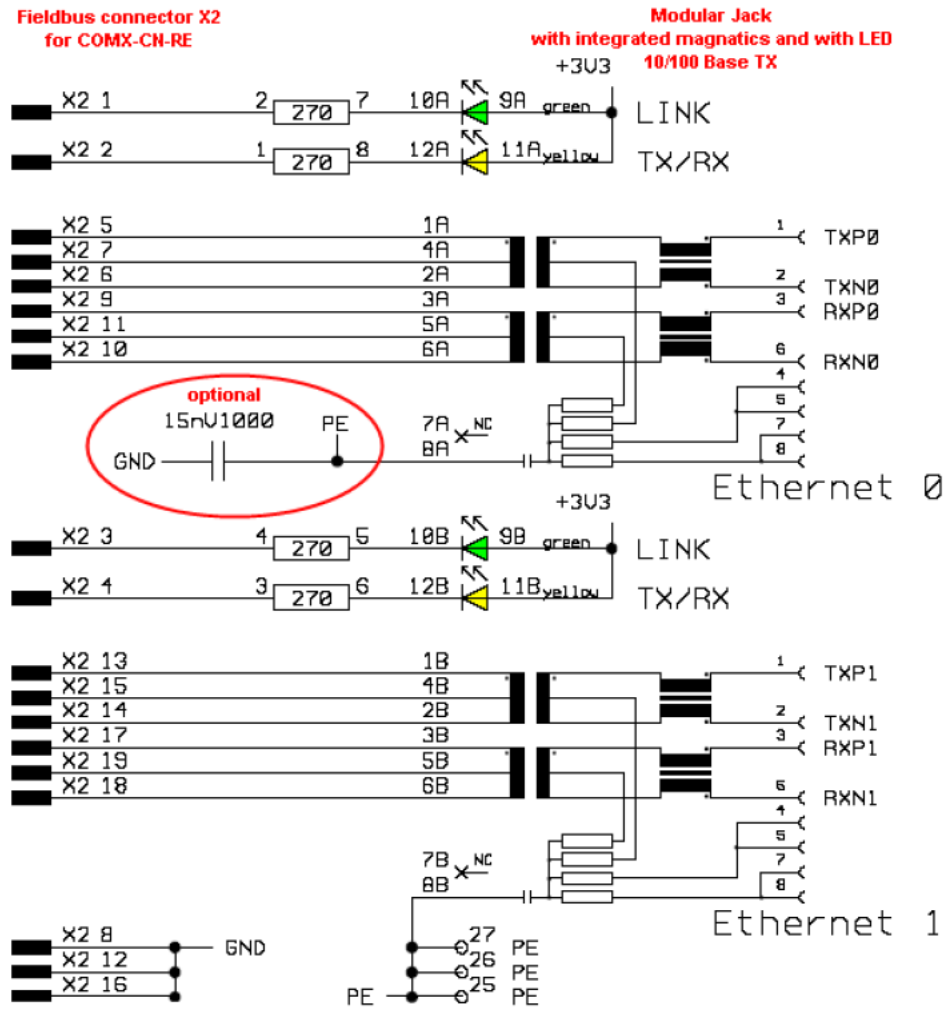


Figure 7: Ethernet Connection COMX-CN-RE

The following figure shows the ERNI connector 203313 as an example:

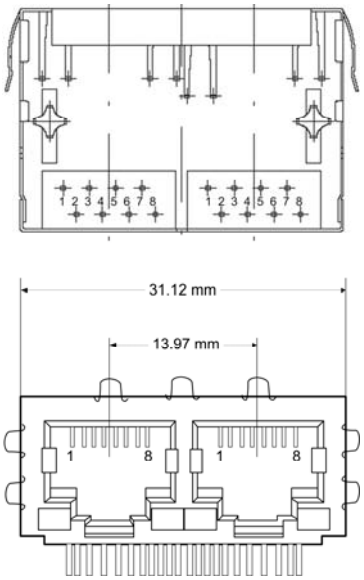


Figure 8: Ethernet Connector Example (ERNI 203313)

3.1.6 Common Signals of the Host Interface

3.1.6.1 Power Supply of the COMX Modules

Only a single 3.3 V operation voltage is needed for the COMX Module. The voltage must be regulated and can have a tolerance of ±5% (3.135 ... 3.465 V) and must be connected twice to the system bus connector X1. To avoid EMI problems we suggest using bypass capacitors in the power supply path. All other special voltages required on the COMX Module are generated by on board DC/DC converter.

A watchdog circuit on all COMX Modules supervises the voltage and the microprocessor. If the voltage decreases below the voltage reset level of typically 2.93 V (2.85 ... 3.00 V) the COMX Module are hold in reset state. If the voltage exceeds the reset voltage threshold the COMX Module will begin with the power up sequence. To avoid problems with the power supply we recommend using a voltage of 3.3 V. So the operation will be in the safe range of voltage operation area and short voltage drops, spikes and noise will not cause any reset conditions.

3.1.6.2 RESET Signal

It is possible to reset the COMX Module by the extra reset signal DPM_RESETn. For operation of the COMX Module it is important to switch the signal DPM_RESETn to high level. Then the COMX Module begins with the program execution and initialization. This power up time is different for each COMX Module. Normally, the time is about less than two seconds. The COMX Module is in reset state when the signal DPM_RESETn has a static low level. To reset the COMX Module the DPM_RESETn signal must be low for more than 10 µs.

Note During Reset all signals of the dual-port memory are configured as inputs! The output level could be floating. If the host system needs a stable level a pull-up or pull-down resistor is required on the host board. The COMX has pull-up resistors on board for the output lines DPM_BUSYn and DPM_DIRQn.

3.1.7 Signals of the Host Interface – Parallel Dual-Port Memory Mode

3.1.7.1 The Dual-Port Memory Bus of COMX

The communication for all input and output data and control commands between the COMX and the host system are exchanged over the dual-port memory. The communication is not compatible to the COM-A/-B-/C devices. The address map of the dual-port memory is different.

Please refer to the special documents for the basic description of the data model and communication methods with devices based on the netX.

From host system side, the dual-port memory looks like static RAM. The dual-port memory size of the COMX module depends on the COMX module type, see section *Dual-Port Memory Size* on page 65.

Only a few signals are used to control the access to the dual-port memory.

The maximum driving capability for the data lines is 8 mA (COMX 50, COMX 100) respectively 6 mA (COMX 10).

To avoid data loss through simultaneous access at the same memory cell, it is necessary to use the DPM_BUSYn signal. See section *BUSY Line to the Host System* on page 51.

3.1.7.2 Address Bus and Data Bus

These signal lines contain the address bus lines DPM_A0 up to DPM_A13 and data bus lines DPM_D0 up to DPM_D15 of the dual-port memory. The address and data lines are non-multiplexed. The address line DPM_A13 is only used at COMX devices to access a linear 16 KByte dual-port memory size.

The COMX devices support additional data bus lines to drive a 16 Bit data interface. If your host interface can support 16 Bit you should connect the DPM_SIRQn signal to ground. If not please let this uncommitted that 16 Bit modules will work in an 8 bit compatible mode.

In case of a 16 Bit system you have to generate the DPM_BHEn and DPM_A0 signal according the following table.

DPM_BHEn	DPM_A0	Function
0	0	word access
0	1	access high byte
1	0	access low byte
1	1	no access

Table 34: Function Table of the 16 Bit Decode Logic

3.1.7.3 Dual-Port Memory Control Lines

The user has to integrate the dual-port memory by mapping the memory space of the dual-port memory into the address range of the host system.

The access to the dual-port memory is handled over the control lines write DPM_WRn, read DPM_RDn and chip select DPM_CSn and could be used like standard static RAM. All signals are low active.

3.1.7.4 Interrupt Line to the Host System

The signal DPM_DIRQn can be used to generate an interrupt to the host system when the netX of the COMX module writes into the specific handshake cells of the dual-port memory. These cells are used for synchronization of the COMX Modules and the host system and have handshake bits. For detailed information about the handshake bits refer to [1]. The interrupt will be cleared if the host reads the handshake cell that was written from the netX of the COMX module.

Important Note:

In interrupt mode, when an 8 bit-host performs a read access to any of the 16 bit wide handshake registers, the netX releases the interrupt as soon as the high byte or the low byte was read. The read order (high byte first or low byte first) is irrelevant. An 8 bit-host shall use polling mode instead of interrupt mode.

Note: Signal DPM_DIRQn has on the module
a 4,7 kΩ pull-up resistor for COMX 10,
a 10 kΩ pull-up resistor for COMX 100 and COMX 50CA-CCS,
a 50 kΩ pull-up resistor for COMX 50CA-REFO.

3.1.7.5 BUSY Line to the Host System

The signal BUSYn is used to insert wait states into a current access from host system to a COMX module. When the signal is active the host must hold on the current transfer.

The timing diagram is described in section *Timing Diagram parallel Dual-Port* Memory Interface on page 52.

Important Note 1: Avoid dual-port memory access errors

It is mandatory that the host CPU always uses the DPM_BUSY signal, otherwise this results in wrong data read from the dual-port memory or dual-port memory write accesses are being ignored.

- The maximum value for accesses can not be specified.
- For maximum performance, the DPM_BUSY signal must always be evaluated by the host CPU.
- If you use a host CPU that can not use the DPM_BUSY signal, then contact our technical support.

Note 2: The COMX has a 10 kOhm pull-up resistor on board for the output line DPM_BUSYn

3.1.7.6 Interfacing to the Dual-Port Memory for COMX

If you connect the host system to the dual-port memory of the COMX Module you have to know some details of the functional working of the netX.

All accesses to the dual-port memory are synchronized to the netX clock and will be then translated into an internal access cycle. This needs some time. To manage the access timing the DPM_BUSYn signal is generated to signal the host system to lengthen the current access cycle until the data could be written or the read data is valid.

An access cycle is started when the chip select line DPM_CSn and read DPM_RDn or write DPM_WRn line are active. The address line must be stable during the complete cycle. It is not possible to switch the address lines during a cycle (no burst access). Moreover there must be a recovery time during two accesses.

For further details please refer the following timing diagrams.

3.1.7.7 Timing Diagram parallel Dual-Port Memory Interface

The following diagram shows the timing for dual-port memory read access.

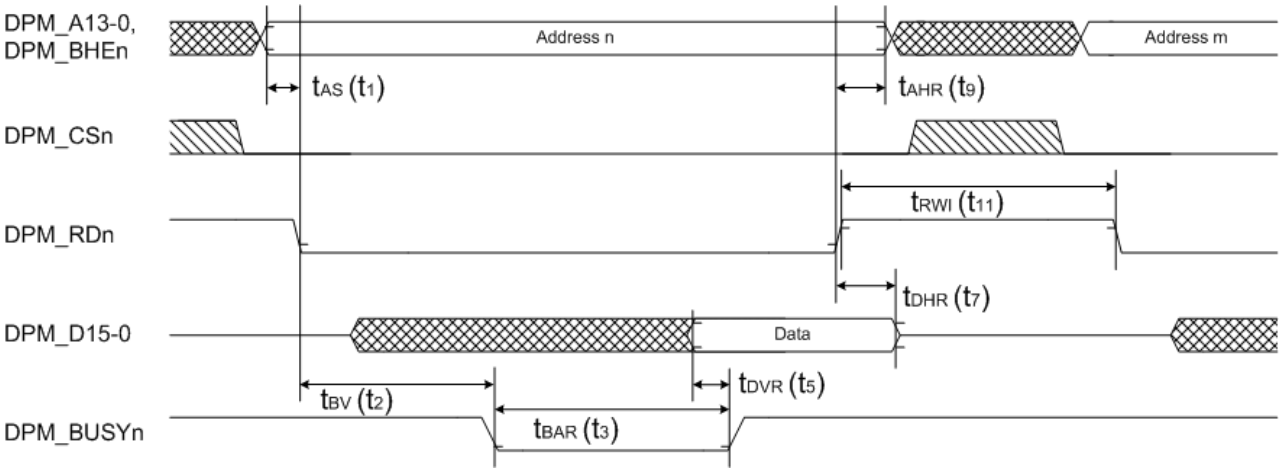


Figure 9: COMX Timing Diagram for Read Access

The following diagram shows the timing for dual-port memory write access.

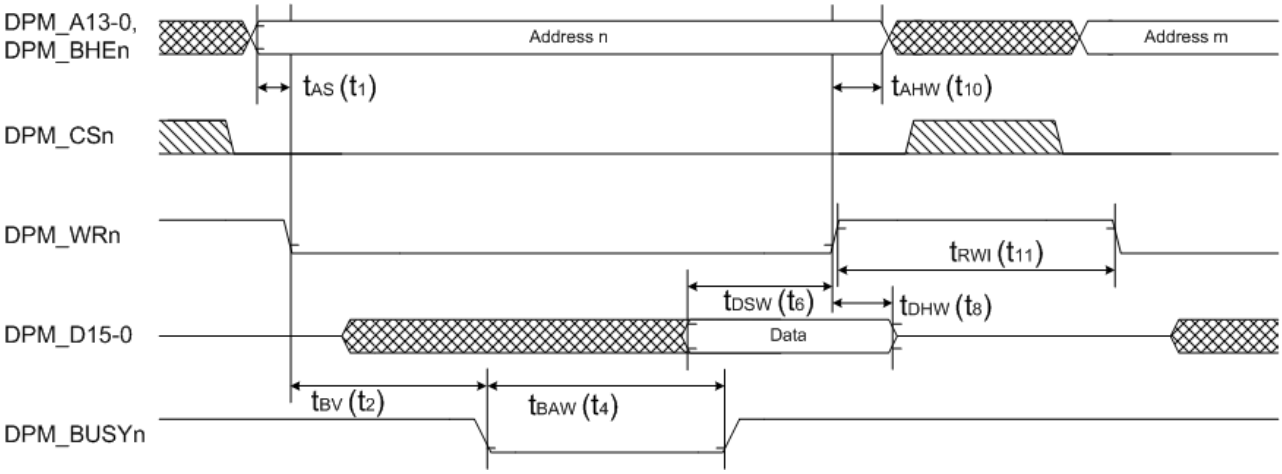


Figure 10: COMX Timing Diagram for Write Access

Description and values are on the next page.

The following table gives the values for the timing parameters for COMX 10 modules using the netX 10 chip, for COMX 50 modules using the netX 50 chip and for COMX 100 using the netX 100 chip. For exchangeability of COMX 10, COMX 50 and COMX 100 communication modules use the values of column **Common** of Table 35.

Symbol		Description	COMX 10 netX 10	COMX 50 netX 50	COMX 100 netX 100	Common
t_1	tAS min.	Minimum address setup time	0.9 ns	1.9 ns	0 ns	2 ns
t_2	tBV max.	Maximum Time from cycle start until BUSYn signal is valid	5.7 ns	35.5 ns	30 ns	40 ns
t_3	tBAR typ.	**Typical** BUSY active time (read access) See note 2	50 ns	50 ns	80 ns	-
	tBAR max.	**See important note 1**	-	-	-	-
t_4	tBAW min.	Minimum BUSY active time (write access)	0 ns	0 ns	0 ns	0 ns
	tBAW max.	**See important note 1**	-	-	-	-
t_5	tDVR min.	Minimum Time between valid data bus signals and rising edge of BUSYn signal	7 ns	8.3 ns	5 ns	5 ns
t_6	tDSW min.	Minimum setup time for write data	10.8 ns	12.1 ns	25 ns	25 ns
t_7	tDHR min.	Minimum read data hold time	2.1 ns	1.5 ns	0 ns	0 ns
t_8	tDHW min.	Minimum hold time for write data	0.8 ns	0 ns	0 ns	1 ns
t_9	tAHR min.	Minimum address hold time	0 ns	0 ns	0 ns	0 ns
t_{10}	tAHW min.	Minimum address hold time	0.9 ns	0 ns	0 ns	1 ns
t_{11}	tRWI	Minimum inactive time for RDn or WRn	10.5 ns	10 ns	10 ns	11 ns

Table 35: Symbols for COMX Timing Diagram for Read and Write Access

Important Note 1: Avoid dual-port memory access errors

It is mandatory that the host CPU always uses the DPM_BUSYn signal, otherwise this results in wrong data read from the dual-port memory or dual-port memory write accesses are ignored.

- The maximum value for accesses cannot be specified.
- For maximum performance, the DPM_BUSYn signal must always be evaluated by the host CPU.
- If you use a host CPU that cannot use the DPM_BUSYn signal, then contact our technical support.

Note 2: The value for tBAR typ. (t_3 typ.) depends on the used firmware/application on the netX.

Note 3: DPM_BHEn only used for 16 bit interface.

3.1.7.8 Integration of COMX Module into a Host System

It is possible to connect the COMX Module to an 8 or 16 Bit data bus. For the 16 Bit interface selection it is necessary to connect the Word Interface Mode line DPM_SIRQn to a low level. If this line is left open the COMX devices will work with an 8 Bit interface like the COM devices.

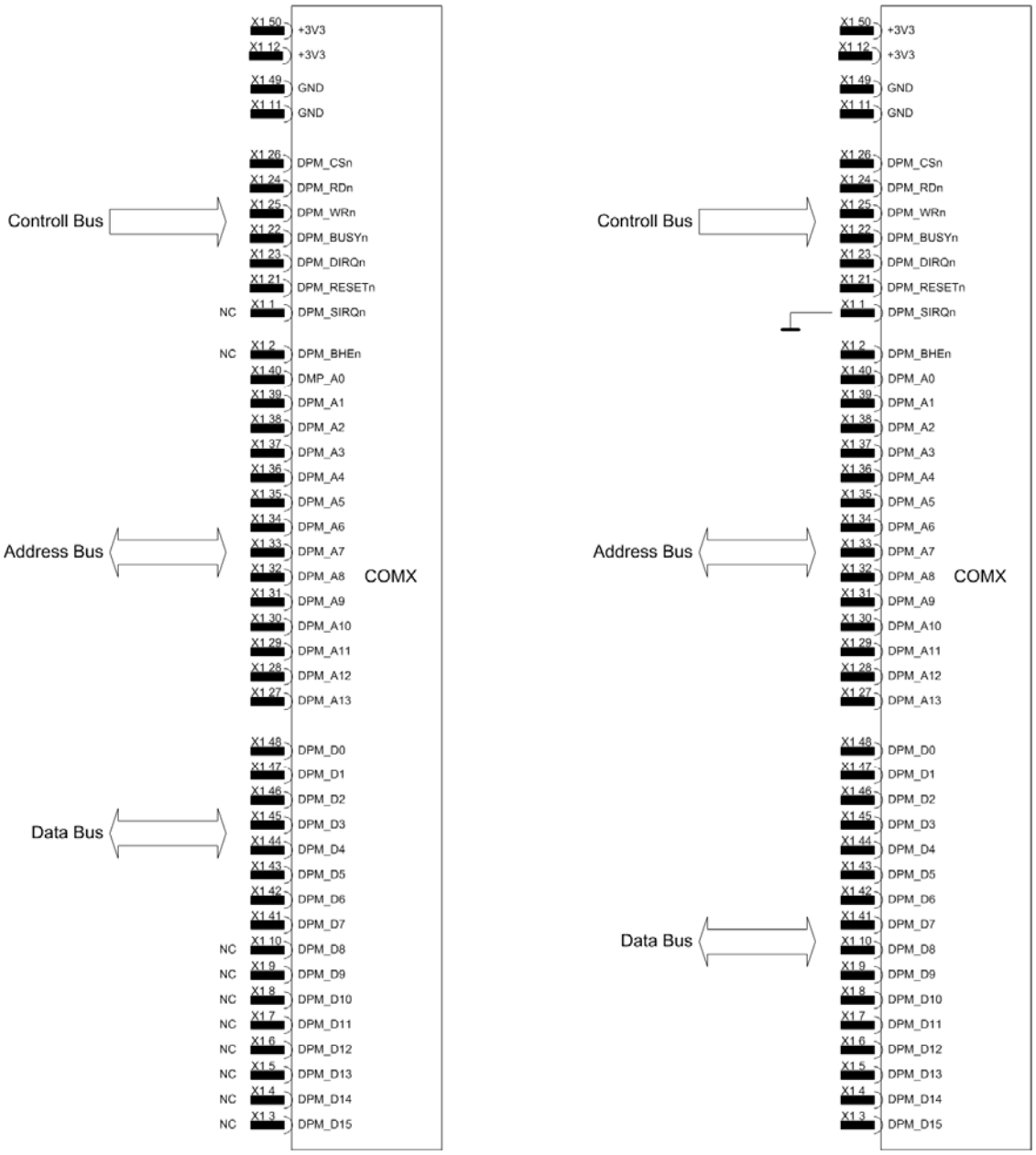


Figure 11: Interface with 8 Bit Data Bus - Interface with 16 Bit Interface

DPM_BHEn	DPM_A0	Function
0	0	word access D[15:0]
0	1 (high)	high byte access D[15:8]
1	0 (low)	low byte access D[7:0]
1	1	no access, illegal

Table 36: Function Table of Decode Logic

3.1.8 Signals of the Host Interface – Serial Dual-Port Memory Mode

The COMX 10 modules offer a SPI Slave interface which will be used for serial access to the dual-port memory of the COMX. The general connection of the serial dual-port memory to any SPI capable host CPU is shown in the following figure.

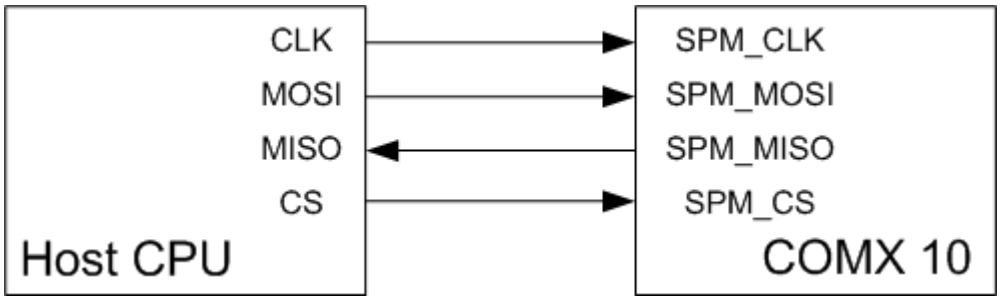


Figure 12: Serial Dual-Port Memory Interface

The default SPI mode is mode 3, CPOL = 1 and CPHA = 1.

Timing Diagram Serial Dual-Port Memory Interface

To access the dual-port memory, see the timing diagram in section *Serial IO Mode Timing* in [5], pages 124 - 125.

Software implementation and Protocol

For information about the software implementation and the protocol see section *Host Software Implementation* and section *Serial DPM Protocol Description* in [4].

3.2 Fieldbus Interface

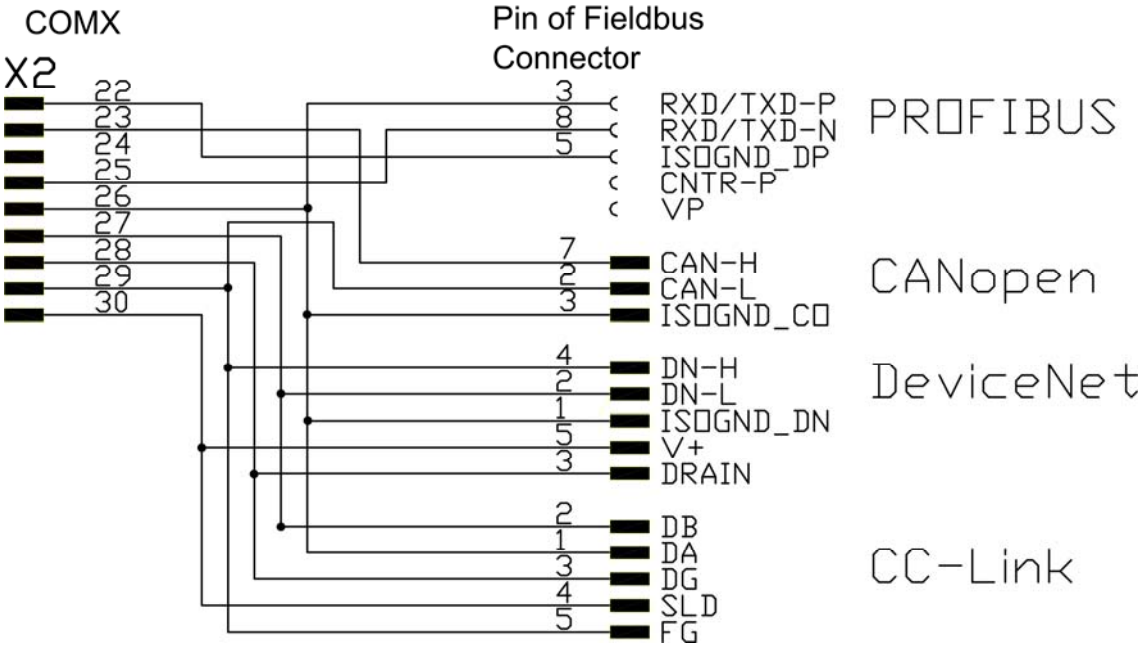


Figure 13: Fieldbus Interface Connections

3.3 LEDs

To get a fast overview about the status of the module and the Communication two duo color LEDs are placed on the module respectively can be connected.

SYS defines the general status of the communication module, means starting 2nd stage bootloader, or firmware. On the module we are using the colors yellow for boot and green for firmware loaded.

2nd Status LED shows communication errors or status and communication activities. If there is no definition in the fieldbus standard we use red for error and green for status. If there is a definition we use these for the functions and colors of that LED. For the modules described in that revision of the manual it is only for DeviceNet the case.

The outputs can drive max. 4 mA. If this is too less an external driver should be placed before the LEDs.

The following schematic shows how to connect the LEDs.

In some cases the brightness of the LEDs of the duo color LEDs are so different that it makes sense to use different resistors to make it equal. This is shown as an example for the LED COM.

The following figure shows the example how to connect the LED for COMX 100CN-CO, COMX 100CN-DN, COMX 100CN-DP. This is the new design for all COMX modules which is compatible to the COM-CN modules.

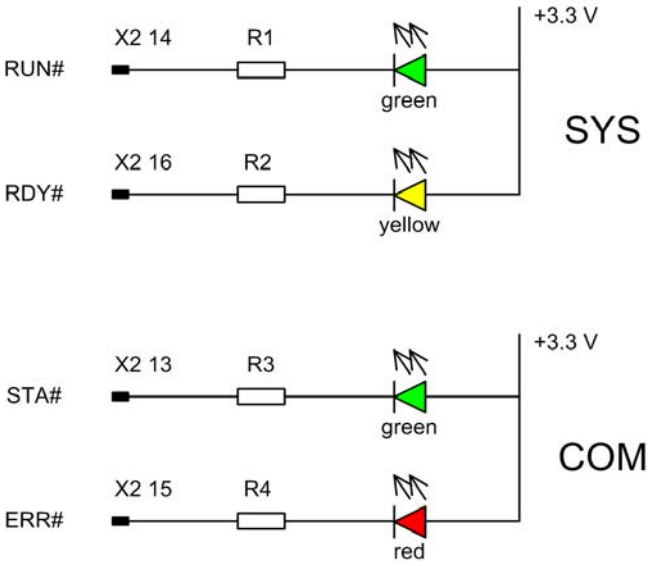


Figure 14: Example how to connect the LEDs COMX CN Fieldbus

The following figure shows the example how to connect the LED for COMX 100CN-RE.

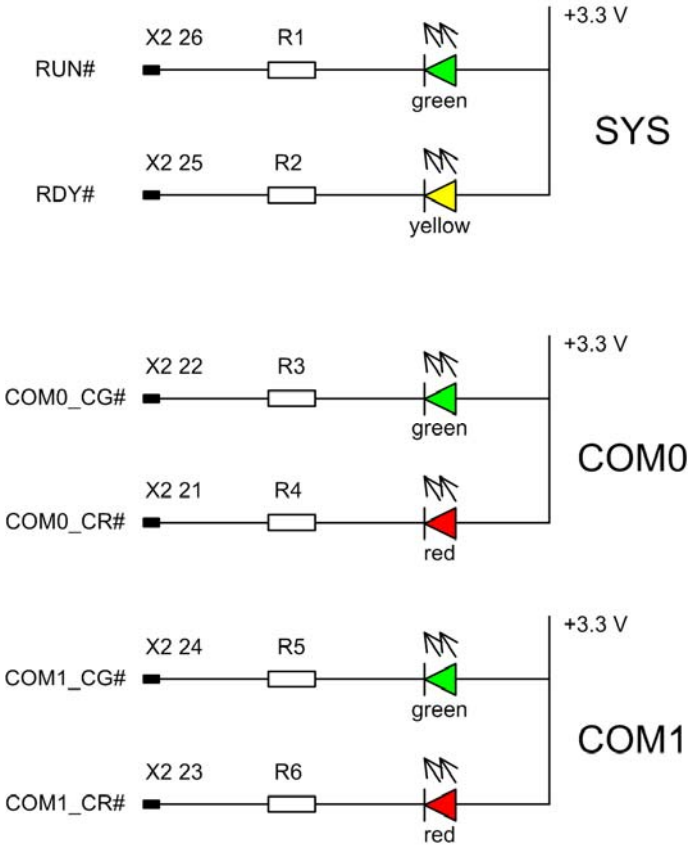


Figure 15: Example how to connect the LEDs COMX 100CN-RE

The meaning of the LED is documented in [2] (english language) and in [3] (german language).

3.4 Diagnostic Interface

3.4.1 Diagnostic Interface RS232C

The signals UART0_TXD and UART0_RXD are transmit and receive signals to use with an RS232C interface for diagnostic purpose.

Over this diagnostic line you can download a new firmware, configuration files or make only diagnostic during running communication.

The following schematic shows an example for the RS232C interface necessary on the host board. The module has not integrated drivers.

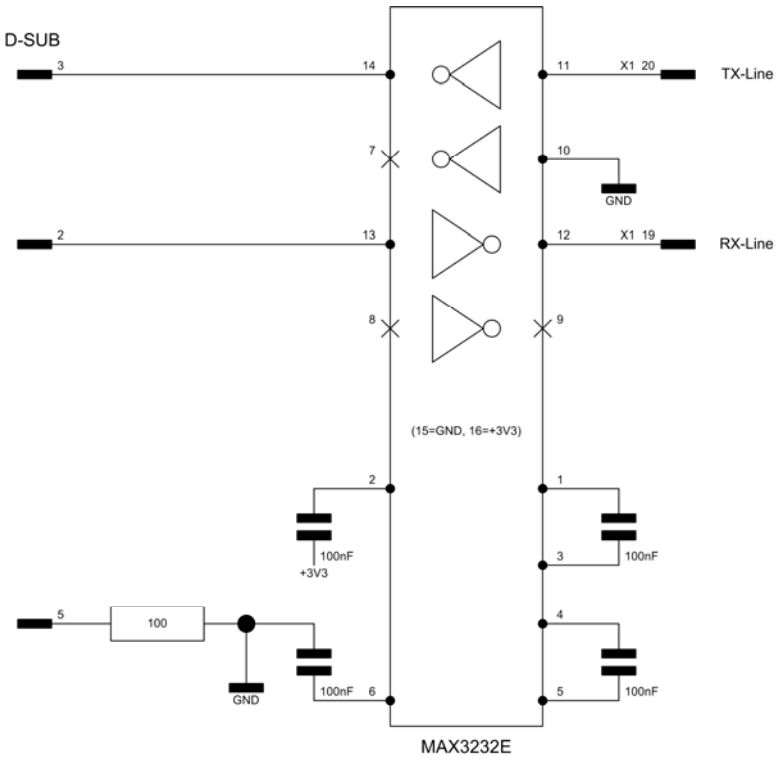


Figure 16: RS232C Interface Circuit for the Diagnostic Interface

The diagnostic interface is galvanically coupled (not potential free).

3.4.2 Diagnostic Interface USB

The COMX modules have an USB port for diagnostic.

The following figure shows the circuit for the USB interface.

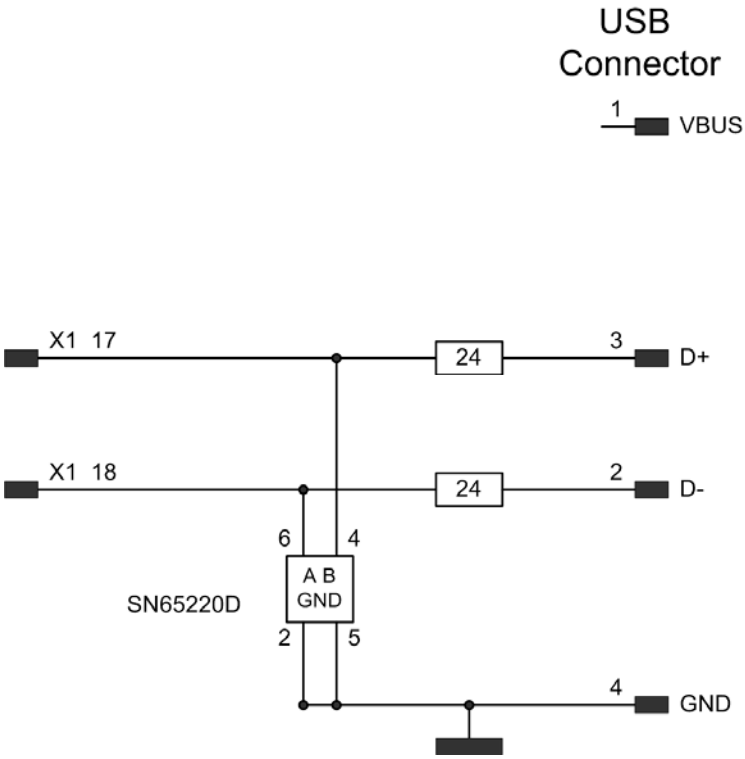


Figure 17: USB Interface Circuit for the Diagnostic Interface

This USB interface is for the COMX modules from the following hardware revision:

Module	Hardware Revision	Remark
COMX 10CA-CCS	1	-
COMX 10CN-CCS	1	-
COMX 10CA-COS	1	-
COMX 10CN-COS	1	-
COMX 10CA-DNS	1	-
COMX 10CN-DNS	1	-
COMX 10CA-DPS	1	-
COMX 10CN-DPS	1	-
COMX 50CA-CCS	3	Firmware does not support USB
COMX 50CA-REFO	2	-
COMX 100CA-CO	4	-
COMX 100CN-CO	3	-
COMX 100CA-DN	4	-
COMX 100CN-DN	3	-
COMX 100CA-DP	4	-
COMX 100CN-DP	3	-
COMX 100CA-RE	7	-
COMX 100CN-RE	2	-

Table 37: Hardware Revision of COMX Modules with new USB Interface

In an earlier version of this document the USB interface was documented with three additional components. These three components need to be removed in order to allow detection of disconnection and reconnection of the USB connection and reestablishment the USB connection in case the COMX module was reset by the operating system Windows.

Don't use the three components as shown in the following figure for the COMX modules revisions listed in table *Hardware Revision of COMX Modules with new USB Interface* on page 60.

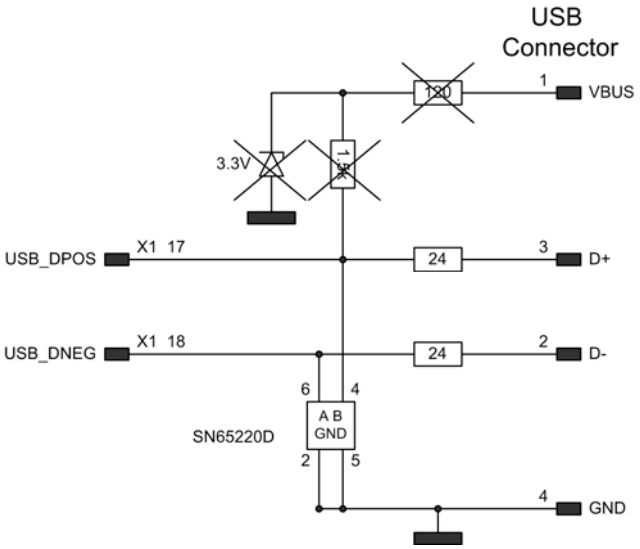
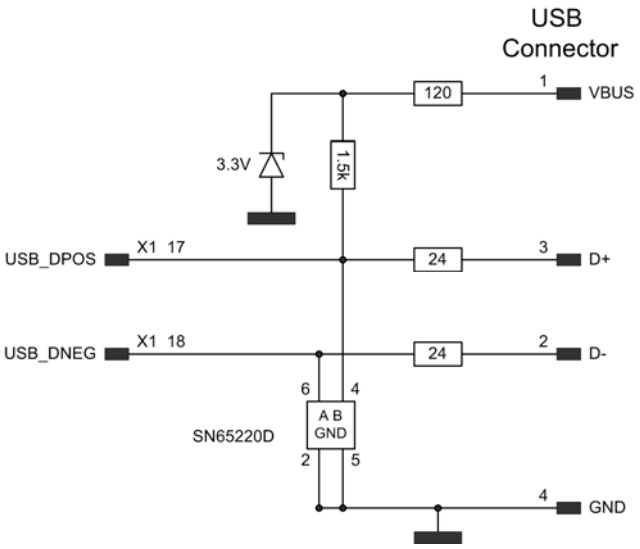


Figure 18: USB Interface Circuit Modification for the Diagnostic Interface

The schematic for the USB interface for the COMX modules for older revisions is shown in the following figure:



This USB interface is for the COMX modules up to the following hardware revision:

Module	Hardware Revision
COMX 100CA-CO	3
COMX 100CN-CO	2
COMX 100CA-DN	3
COMX 100CN-DN	2
COMX 100CA-DP	3
COMX 100CN-DP	2
COMX 50CA-CCS	2
COMX 100CA-RE	6
COMX 100CN-RE	1

Table 38: Hardware Revision of COMX Modules with old USB Interface

3.5 SYNC Signals

COMX 100CA-RE and COMX 100CN-RE provide SYNC signals.

The SYNC Signal has LVTTL level (3,3 V). A maximum load of 6 mA may not be exceeded.

NOTICE

Possible Destruction of the Device due to high current!

Make sure that never two outputs drive against each other. Two outputs that drive against each other cause a too high current and result in device damage.

This situation can happen for example, if the host system has an output signal connected to SYNC0 and a firmware is loaded that uses SYNC0 as output too.

It is also strongly recommended to keep the cable length for the SYNC signals below 50 mm and to take EMC aspects into account. In general, both SYNC signal lines can be used as input or output. The loaded firmware determines whether the line is used for an input signal or output signal. The following table shows the meaning of the SYNC signals for the real-time Ethernet protocols currently offering SYNC signal support.

Protocol	Signal SYNC0 Input/Output	Signal SYNC1 Input/Output	From Firmware Version	Remarks
EtherCAT Slave	SYNC 0 Output	SYNC 1 Output	-	Configurable
PROFINET IO Device	Bus cycle start (PROFINET IRT) Output	-	3.4.x.x	-
sercos III Master	External trigger to start bus cycle Input Rising edge	-	2.0.8.0	-
sercos III Slave	CON_CLK Output	DIV_CLK Output	3.0.10.0	Configurable

Table 39: Meaning of the SYNC Signals for each Protocol

4 Technical Data

Operating Condition			Minimum	Maximum
Operating temperature [° C] COMX	Standard		-20° C COMX 50-CA-CCS: 0° C	+65° C COMX 100CA-RE and COMX 100CN-RE: +60° C
Storage temperature [° C]	Standard Extended		-25° C -40° C	+70° C +85° C
Operating voltage [V]		U1	+3.1 V	+3.5 V
			Typical	**Maximum**
Operating current [mA]	COMX 10XX-CCS	U1	225 mA	260 mA
	COMX 10XX-COS	U1	250 mA	290 mA
	COMX 10XX-DPS	U1	200 mA	230 mA * 1005 mA **
	COMX 10XX-DNS	U1	250 mA	290 mA
	COMX 50XX-CCS	U1	270 mA	350 mA
	COMX 50XX-REFO	U1	950 mA	1100 mA
	COMX 100XX-CO	U1	450 mA	480 mA
	COMX 100XX-DN	U1	440 mA	470 mA
	COMX 100XX-DP	U1	430 mA	460 mA *
	COMX 100XX-RE	U1	700 mA	700 mA

Table 40: Technical Data – Operating Conditions

* Maximum current for normal operation

** Maximum current in case of bus short circuit (Pin 6 (+5 V) against pin 5 (ISOGND))

EMC			Generic Standard	Basic Standard
Immunity			EN 61000-6-2 (1999) Industrial Environment	EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6 Details are listed in chapter 4.2
Emission			EN 61000-6-4	EN55011

Table 41: Technical Data - EMC

Mechanical Dimensions			Minimum	Maximum
Dimensions COMX			 30 x 70 x 21.5 mm	 40 x 70 x 21.5 mm for further extension
Weight			35 gr.	40 gr.

Table 42: Technical Data – Mechanical Dimensions

4.1 Dual-Port Memory Size

The following table lists the dual-port memory size for the different COMX Modules.

Module	Fieldbus / Protocol	Dual-port Memory Size
COMX 10		
COMX 10CA-COS	CANopen Slave	8 KByte
COMX 10CN-COS	CANopen Slave	
COMX 10CA-CCS	CC-Link Slave	
COMX 10CN-CCS	CC-Link Slave	
COMX 10CA-DPS	PROFIBUS DP Slave	
COMX 10CN-DPS	PROFIBUS DP Slave	
COMX 10CA-DNS	DeviceNet Slave	
COMX 10CN-DNS	DeviceNet Slave	
COMX 50		
COMX 50CA-CCS	CC-Link Slave	16 KByte
COMX 50CA-REFO	PROFINET IO Device	
COMX 100		
COMX 100CA-CO	CANopen Master or Slave	16 KByte
COMX 100CN-CO	CANopen Master or Slave	
COMX 100CA-DN	DeviceNet Master or Slave	
COMX 100CN-DN	DeviceNet Master or Slave	
COMX 100CA-DP	PROFIBUS DP Master or Slave	
COMX 100CN-DP	PROFIBUS DP Master or Slave	
COMX 100CA-RE	Realtime Ethernet Master or Slave	
COMX 100CN-RE	Realtime Ethernet Master or Slave	

Table 43: Dual-port Memory Size of the comX Modules

4.2 Product Tests

The following results have been determined in various product tests of the individual versions of COMX.

4.2.1 COMX 10CA-CCS

Immunity COMX 10CA-CCS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 8 kV	B
		Contact discharge	± 6 kV	B
EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2.5 kV	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV	A

Table 44: Product Tests COMX 10CA-CCS – Immunity

4.2.2 COMX 10CN-CCS

Immunity COMX 10CN-CCS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 8 kV	B
		Contact discharge	± 6 kV	B
EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2.5 kV	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV	A

Table 45: Product Tests COMX 10CN-CCS – Immunity

4.2.3 COMX 10CA-COS

Immunity COMX 10CA-COS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV	A

Table 46: Product Tests COMX 10CA-COS – Immunity

4.2.4 COMX 10CN-COS

Immunity COMX 10CN-COS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV	A

Table 47: Product Tests COMX 10CN-COS – Immunity

4.2.5 COMX 10CA-DPS

Immunity COMX 10CA-CCS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 8 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2.2 kV	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV	B

Table 48: Product Tests COMX 10CA-DPS – Immunity

4.2.6 COMX 10CN-DPS

Immunity COMX 10CN-CCS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2.5 kV	A
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV	A

Table 49: Product Tests COMX 10CN-DPS – Immunity

4.2.7 COMX 10CA-DNS

Immunity COMX 10CA-DNS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	0.5 kV	B

Table 50: Product Tests COMX 10CA-DNS – Immunity

4.2.8 COMX 10CN-DNS

Immunity COMX 10CN-DNS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV	A

Table 51: Product Tests COMX 10CN-DNS – Immunity

4.2.9 COMX 50CA-REFO

Immunity COMX 10CN-DNS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV	B

Table 52: Product Tests COMX 50CA-REFO – Immunity

4.2.10 COMX 50CA-CCS

Immunity COMX 50CA-CCS				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 8 kV	B
		Contact discharge	± 4 kV	A
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV fr = 5 kHz	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	A

Table 53: Product Tests COMX 50CA-CCS – Immunity

4.2.11 COMX 100CA-CO

Immunity COMX 100CA-CO				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	A
		Contact discharge	± 6 kV	A
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV fr = 5 kHz	A
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	A

Table 54: Product Tests COMX 100CA-CO – Immunity

4.2.12 COMX 100CA-DN

Immunity COMX 100CA-DN				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 8 kV	B
		Contact discharge	± 4 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV fr = 5 kHz	B
		DeviceNet 24 V power supply (unshielded)	± 2 kV fr = 5 kHz	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	B
		DeviceNet 24 V power supply (unshielded) (24 V---PE, GND---PE)	1 kV	B
		DeviceNet 24 V power supply (unshielded) (24 V---GND)	0,6 kV	B

Table 55: Product Tests COMX 100CA-DN - Immunity

4.2.13 COMX 100CA-DP

Immunity COMX 100CA-DP				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	A
		Contact discharge	± 6 kV	A
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV fr = 5 kHz	A
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	A

Table 56: Product Tests COMX 100CA-DP – Immunity

4.2.14 COMX 100CA-RE

Immunity COMX 100CA-RE				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 8 kV	B
		Contact discharge	± 4 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV fr = 5 kHz	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	A

Table 57: Product Tests COMX 100CA-RE – Immunity

4.2.15 COMX 100CN-CO

Immunity COMX 100CN-CO				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines	± 2 kV fr = 5 kHz	A
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	A

Table 58: Product Tests COMX 100CN-CO – Immunity

4.2.16 COMX 100CN-DN

Immunity COMX 100CN-DN				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV fr = 5 kHz	B
		DeviceNet 24 V power supply (unshielded)	± 2 kV fr = 5 kHz	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	B
		DeviceNet 24 V power supply (unshielded) (24 V---PE, GND---PE)	1 kV	B
		DeviceNet 24 V power supply (unshielded) (24 V---GND)	0,6 kV	B

Table 59: Product Tests COMX 100CN-DN – Immunity

4.2.17 COMX 100CN-DP

Immunity COMX 100CN-DP				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 10 kV	B
		Contact discharge	± 6 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV fr = 5 kHz	A
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	A

Table 60: Product Tests COMX 100CN-DP – Immunity

4.2.18 COMX 100CN-RE

Immunity COMX 100CN-RE				
Generic Standard	Basic Standard	Test	Test level	Error Class
EN 61000-6-2 (2006-03) Industrial Environment EN 61131-2 (2008-04)+A11, A12 Programmable Controllers	EN 61000-4-2	Electrostatic Discharge		
		Air discharge	± 8 kV	A
		Contact discharge	± 4 kV	B
	EN 61000-4-4	Burst		
		Communication lines (shielded)	± 2 kV fr = 5 kHz	B
	EN 61000-4-5	Surge		
		Communication lines (shielded)	1 kV 2 Ohm / 18 µF	A

Table 61: Product Tests COMX 100CN-RE - Immunity

5 Appendix

5.1 List of Tables

5.2 List of Figures

5.3 Contacts

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