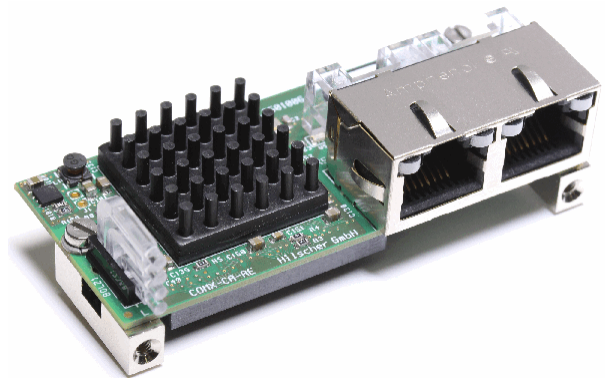


**Design Guide**  
**COMX Communication Modules**



**Hilscher Gesellschaft für Systemautomation mbH**  
**[www.hilscher.com](http://www.hilscher.com)**

DOC100901DG27EN | Revision 27 | English | 2024-01 | Released | Public

# Table of contents

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Introduction.....</b>   | <b>4</b>  |
| 1.1      | About this document .....  | 4         |
| 1.2      | Comparison COMX and COM modules.....   | 5         |
| 1.3      | List of revisions .....  | 6         |
| 1.4      | Technical features .....   | 7         |
| 1.5      | Module names.....  | 9         |
| 1.6      | References to documents .....  | 10        |
| <b>2</b> | <b>Design-in - Mechanical aspects .....</b>                                      | <b>11</b> |
| 2.1      | Type of COMX modules.....  | 11        |
| 2.2      | Mechanical dimensions.....   | 13        |
| 2.2.1    | Common mechanical dimensions for COMX modules .....                              | 13        |
| 2.2.2    | Mechanical dimensions of COMX modules .....                                      | 13        |
| 2.3      | Type of connector .....  | 22        |
| 2.3.1    | Storage and contact reliability of host-side connector .....                     | 24        |
| 2.4      | Mounting of COMX modules .....   | 25        |
| 2.5      | Material recommendation for the faceplate.....                                   | 31        |
| 2.6      | Designation of the COMX module .....   | 31        |
| 2.7      | Meaning of the address switch .....  | 31        |
| 2.7.1    | PROFIBUS DP Slave .....  | 31        |
| 2.7.2    | CANopen Slave.....   | 32        |
| 2.7.3    | DeviceNet Slave.....   | 32        |
| 2.7.4    | CC-Link Slave .....  | 33        |
| 2.7.5    | EtherCAT Slave.....  | 34        |
| <b>3</b> | <b>Design-in - Electrical aspects .....</b>                                      | <b>35</b> |
| 3.1      | Host interface .....   | 35        |
| 3.1.1    | Host interface overview: Dual-port memory sizes and modes.....                   | 35        |
| 3.1.2    | Host interface: Parallel or serial dual-port memory mode.....                    | 36        |
| 3.1.2.1  | COMX 100.....  | 36        |
| 3.1.2.2  | COMX 51 and COMX 52 .....  | 36        |
| 3.1.3    | COMX pin assignment of the system bus connector X1 – Parallel mode.....          | 37        |
| 3.1.4    | COMX pin assignment of the system bus connector X1 – Serial mode .....           | 39        |
| 3.1.5    | PAD type explanation.....  | 41        |
| 3.1.6    | Signal overview and pin assignment of the fieldbus connector X2 on COMX CN ..... | 43        |
| 3.1.6.1  | Fieldbus connector X2 for CC-Link Slave .....                                    | 43        |
| 3.1.6.2  | Fieldbus connector X2 for CANopen-Master/-Slave .....                            | 44        |
| 3.1.6.3  | Fieldbus Connector X2 for DeviceNet-Master/-Slave .....                          | 45        |
| 3.1.6.4  | Fieldbus Connector X2 for PROFIBUS-Master/-Slave.....                            | 46        |
| 3.1.6.5  | Fieldbus Connector X2 for Real Time Ethernet .....                               | 47        |
| 3.1.7    | Common signals of the host interface .....                                       | 49        |
| 3.1.7.1  | Power supply of the COMX modules .....   | 49        |
| 3.1.7.2  | RESET signal .....   | 49        |
| 3.1.8    | Signals of the host interface – Parallel dual-port memory mode .....             | 49        |
| 3.1.8.1  | The dual-port memory bus of COMX .....   | 49        |
| 3.1.8.2  | Address bus and data bus .....   | 50        |
| 3.1.8.3  | Dual-port memory control lines .....   | 50        |
| 3.1.8.4  | Interrupt line to the host system.....   | 50        |
| 3.1.8.5  | BUSY line to the host system .....   | 51        |
| 3.1.8.6  | Interfacing to the dual-port memory for COMX .....                               | 51        |
| 3.1.8.7  | Timing diagram parallel dual-port memory interface .....                         | 52        |
| 3.1.8.8  | Integration of COMX module into a host system.....                               | 54        |
| 3.1.9    | Signals of the host interface – Serial dual-port memory mode .....               | 55        |
| 3.2      | Fieldbus interface.....  | 56        |
| 3.3      | LEDs.....  | 57        |
| 3.4      | Diagnostic interface.....  | 59        |
| 3.4.1    | Diagnostic interface RS232C .....  | 59        |
| 3.4.2    | Diagnostic interface USB.....  | 60        |
| 3.5      | SYNC signals .....   | 63        |
| <b>4</b> | <b>Technical data.....</b>   | <b>64</b> |
| 4.1      | Product tests .....  | 66        |
| 4.1.1    | COMX 51CA-RE .....   | 66        |
| 4.1.2    | COMX 51CA-RE\R.....  | 66        |

|          |                             |           |
|----------|-----------------------------|-----------|
| 4.1.3    | COMX 51CN-RE .....          | 66        |
| 4.1.4    | COMX 52CA-CCS .....         | 67        |
| 4.1.5    | COMX 52CA-COS .....         | 67        |
| 4.1.6    | COMX 52CA-DPS .....         | 67        |
| 4.1.7    | COMX 52CA-DNS .....         | 67        |
| 4.1.8    | COMX 52CN-CCS .....         | 68        |
| 4.1.9    | COMX 52CN-COS .....         | 68        |
| 4.1.10   | COMX 52CN-DPS .....         | 68        |
| 4.1.11   | COMX 52CN-DNS .....         | 69        |
| 4.1.12   | COMX 100CA-CO .....         | 69        |
| 4.1.13   | COMX 100CA-DN .....         | 69        |
| 4.1.14   | COMX 100CA-DP .....         | 70        |
| 4.1.15   | COMX 100CA-RE .....         | 70        |
| 4.1.16   | COMX 100CN-CO .....         | 70        |
| 4.1.17   | COMX 100CN-DN .....         | 71        |
| 4.1.18   | COMX 100CN-DP .....         | 71        |
| 4.1.19   | COMX 100CN-RE .....         | 71        |
| <b>5</b> | <b>Appendix .....</b>       | <b>72</b> |
| 5.1      | Legal notes .....           | 72        |
| 5.2      | Registered trademarks ..... | 75        |
| 5.3      | List of tables .....        | 76        |
| 5.4      | List of figures .....       | 77        |
| 5.5      | Contacts .....              | 78        |

# 1 Introduction

## 1.1 About this document

COMX means **C**ommunication **M**odules **netX**. 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 Ethernet and fieldbus systems.

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 a separate 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<br>See section <i>Host interface overview: Dual-port memory sizes and modes</i> on page 35. |
| USB Interface           | No                 | Yes   |
| Serial dual-port memory | No                 | Yes. See section <i>Host interface overview: Dual-port memory sizes and modes</i> on page 35.                   |

Table 1: Basic differences between COM and COMX

Comparison of supported protocols for COM and COMX

| Protocol                         | COM       | COMX (in this manual)            |
|----------------------------------|-----------|----------------------------------|
| AS-Interface Master              | supported | -                                |
| CANopen Master                   | supported | supported                        |
| CANopen Slave                    | supported | supported                        |
| CC-Link Slave                    | supported | supported                        |
| CC-Link IE Field Basic Slave     | -         | supported                        |
| 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                        |
| 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 Controller           | -         | supported                        |
| PROFINET IO Device               | -         | supported                        |
| Sercos Master (third generation) | -         | supported                        |
| Sercos Slave (third generation)  | -         | supported                        |
| Sercos II (second generation)    | supported | not supported by netX technology |
| VARAN Client (Slave)             | -         | supported                        |

Table 2: Comparison of supported protocols for COM and COMX

## 1.3 List of revisions

| Rev | Date       | Name                 | Chapter                                  | Revision  |
|-----|------------|----------------------|--|---|
| 20  | 2015-09-11 | HH                   | All<br>2.2.2<br>3.1.9<br>4.1.1           | COMX 51CN-RE added.<br>Section <i>Mechanical dimensions of COMX modules</i> : updated to M0300637, updated to M0600176<br>Section Signals of the host interface – Serial dual-port memory mode: Figure 24 updated.<br>Section COMX 51CA-RE, COMX 51CN-RE added.   |
| 21  | 2015-11-30 | HH<br>RG<br>RG<br>HH | 2.2.2<br>3.1.2.1,<br>3.1.2.2<br>3.5<br>4 | Section <i>Mechanical dimensions of COMX modules</i> : updated to M0203764, updated to M0204664.<br>Note added about power-cycle required in order to switch 8/16 bit mode.<br>Section <i>SYNC signals</i> extended due to PROFINET IO IRT certification.<br>Max. Current for COMX 51XX-RE reduced to 580 mA. |
| 22  | 2018-12-07 | HH                   | All<br>All<br>2.2.2                      | CC-Link IE Field Basic Slave added.<br>CC-Link IE Field Slave prepared.<br>Section <i>Mechanical dimensions of COMX modules</i> : updated to M1100132.  |
| 23  | 2020-11-27 | RGÖ, HHE             | All                                      | COMX 52CA-DPS, -DNS, -COS, -CCS added.<br>COMX 10XX-XXX removed.<br>COMX 50CA-REFO, COMX 50CA-CCS removed.  |
| 24  | 2021-02-19 | RGÖ, HHE             | All                                      | COMX 52CN-DPS, -DNS, -COS added.  |
| 25  | 2021-08-10 | RGÖ, HHE             | All                                      | COMX 51CA-RE\R EtherCAT module with rotary switches added.  |
| 26  | 2022-03-30 | RGÖ                  | All                                      | COMX 52CN-CCS added.  |
| 27  | 2024-01-29 | HHE                  | 4  | COMX 100-CN-DP revision 5 has operating temperature:<br>-20 °C to 70 °C.  |

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 KByte (COMX 52) and for 16 KByte (COMX 51 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 52 modules and the COMX 51CA-RE\R module have address switches to set the bus address
- COMX 51 and COMX 52 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 or without fieldbus connectors:

- COMX CN: COMX modules without fieldbus respectively Ethernet connector
- COMX CA: COMX modules with angled fieldbus respectively Ethernet 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 V voltage. All other voltages are created by DC/DC converter on the COMX module.

The access to the COMX module is through the parallel 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.

Alternatively, a serial dual-port memory based on SPI can be used as interface to the host system. Table 19 on page 35 lists the supported modes of COMX modules.

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

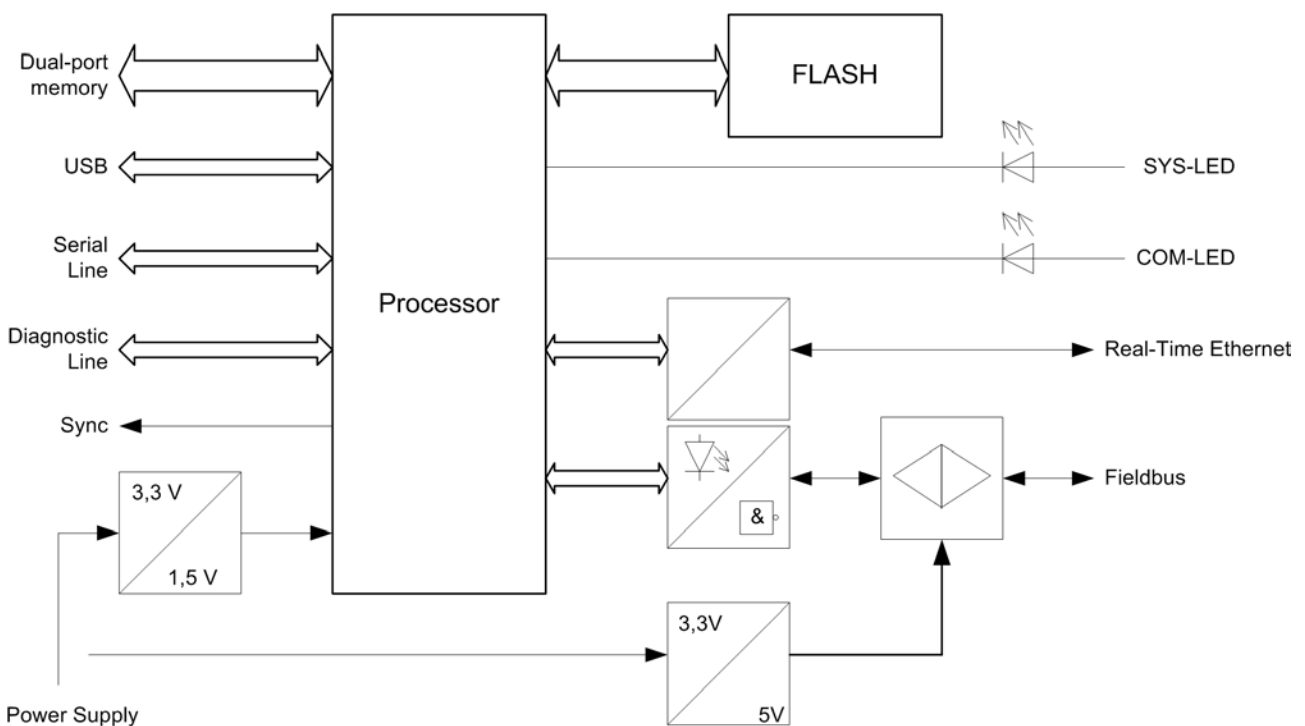


Figure 1: Block diagram of the COMX modules



## 1.5 Module names

The following table lists all COMX modules. The range of products has been expanded with COMX modules with netX 51 or with netX 52. 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 '51/52' to the name, which indicates that netX 51/52 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 51CA-RE    |
|                      | -               | COMX 51CA-REVR  |
|                      | -               | COMX 51CN-RE    |
| 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 52CA-COS   |
|                      | -               | COMX 52CN-COS   |
| CC-Link Slave        | -               | COMX 52CA-CCS   |
|                      | -               | COMX 52CN-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 52CA-DNS   |
|                      | -               | COMX 52CN-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 52CA-DPS   |
|                      | -               | COMX 52CN-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 17, English, 2020.
- [2] Hilscher Gesellschaft für Systemautomation mbH: User Manual, comX, Communication Modules for Real-Time Ethernet and Fieldbus, Revision 13, English, 2024.
- [3] Hilscher Gesellschaft für Systemautomation mbH: Benutzerhandbuch, comX, Kommunikationsmodule für Real-Time Ethernet und Feldbus, Revision 13, German, 2024.
- [4] Hilscher Gesellschaft für Systemautomation mbH: Getting Started Guide, Serial Dual-Port Memory Interface with netX, Revision 6, English, 2018.
- [5] Hilscher Gesellschaft für Systemautomation mbH: Technical Data Reference Guide, netX 51/52, Revision 3, English, 2017.

*Table 5: References to documents*

## 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 |
|-----------------|---------------------|---|-----------|
| <b>COMX 51</b>  |                     |   |           |
| COMX 51CA-RE,   | Real-Time Ethernet  | Slave   | angled    |
| COMX 51CA-RE\R  | EtherCAT            | Slave   | angled    |
| COMX 51CN-RE    | Real-Time Ethernet  | Slave   | no        |
| <b>COMX 52</b>  |                     |   |           |
| COMX 52CA-COS   | CANopen             | Slave   | angled    |
| COMX 52CN-COS   | CANopen             | Slave   | no        |
| COMX 52CA-CCS   | CC-Link             | Slave   | angled    |
| COMX 52CN-CCS   | CC-Link             | Slave   | no        |
| COMX 52CA-DPS   | PROFIBUS DP         | Slave   | angled    |
| COMX 52CN-DPS   | PROFIBUS DP         | Slave   | no        |
| COMX 52CA-DNS   | DeviceNet           | Slave   | angled    |
| COMX 52CN-DNS   | DeviceNet           | Slave   | no        |
| <b>COMX 100</b> |                     |   |           |
| COMX 100CA-CO   | CANopen             | Master or Slave<br>(depends on loaded firmware) | angled    |
| COMX 100CN-CO   | CANopen             | Master or Slave<br>(depends on loaded firmware) | no        |
| COMX 100CA-DN   | DeviceNet           | Master or Slave<br>(depends on loaded firmware) | angled    |
| COMX 100CN-DN   | DeviceNet           | Master or Slave<br>(depends on loaded firmware) | no        |
| COMX 100CA-DP   | PROFIBUS DP         | Master or Slave<br>(depends on loaded firmware) | angled    |
| COMX 100CN-DP   | PROFIBUS DP         | Master or Slave<br>(depends on loaded firmware) | no        |
| COMX 100CA-RE   | Real-Time Ethernet  | Master or Slave<br>(depends on loaded firmware) | angled    |
| COMX 100CN-RE   | Real-Time Ethernet  | Master or Slave<br>(depends on loaded firmware) | no        |

Table 6: Available comX modules

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

CA Types

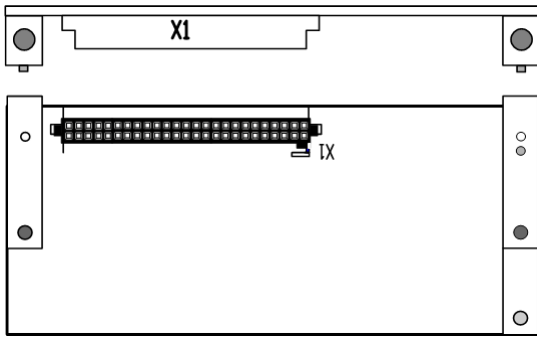


Figure 2: COMX CA type - Connector X1

CN Types

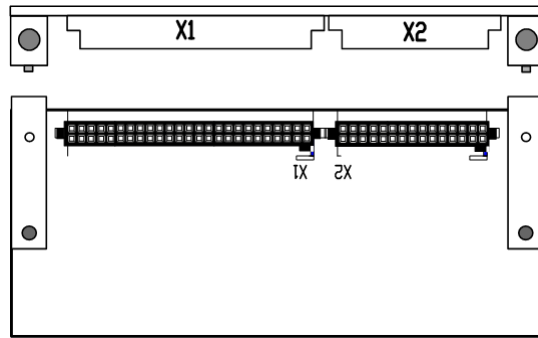


Figure 3: COMX CN type - Connectors X1 and X2

## 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 do 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:

| <b>Drawing</b> | <b>Title</b>   | <b>Page</b> |
|----------------|--|-------------|
| M0203764       | General Mechanical dimension of COMX-CA-XXX  | 15          |
| M0204664       | Mechanical dimension of COMX-CN-XXX  | 16          |
| M0300638       | Mechanical dimension of light pipe of COMX 51/52/100CA-XXX                         | 17          |
| M0600177       | Mechanical dimension of cover and connector of COMX 51/100CA-RE and COMX 51CA-RE\R | 18          |
| M1100134       | Mechanical dimension of cover and connector of COMX 51CA-RE\R                      | 19          |
| M1100133       | Mechanical dimension of cover and connector of COMX 52CA-XXX (Fieldbus)            | 20          |
| M0900164       | Mechanical dimension of cover and connector of COMX 100CA-XXX (Fieldbus)           | 21          |

Table 8: Mechanical dimensions (Drawings overview)

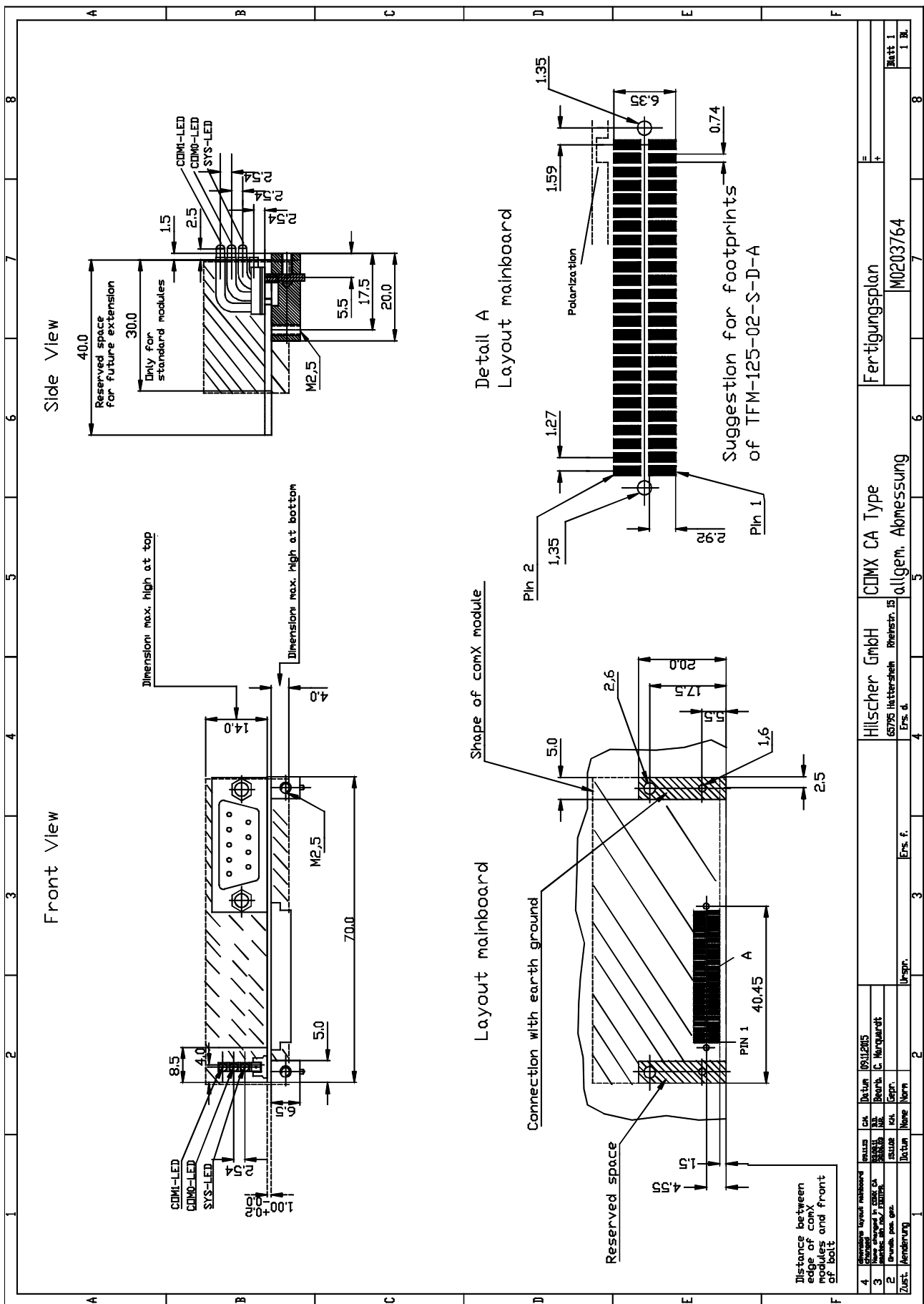


Figure 4: General Mechanical dimension of COMX-CA-XXX

|                   |   |                    |  |
|-------------------|---|--------------------|--|
| Fertigungsplan    |   | M0203764           |  |
| Hilscher GmbH     |   | COMX CA Type       |  |
| 63795 Hattersheim |   | allgem. Abmessung  |  |
| Rheinstr. 15      |   | Ers. d.            |  |
| Ers. f.           |   | Inspir.            |  |
| 4                 | Revisions- / Änderungs- / Ersatzteil- / Zeichnungs- / Datum | 05.12.2015         |  |
| 3                 | Gezeichnet  | Benr. C. Marquardt |  |
| 2                 | Geprüft   | Kal. / Erg.        |  |
| 1                 | Gezeichnet  | Benr. C. Marquardt |  |
| Zust.             | Abmessung   |                    |  |

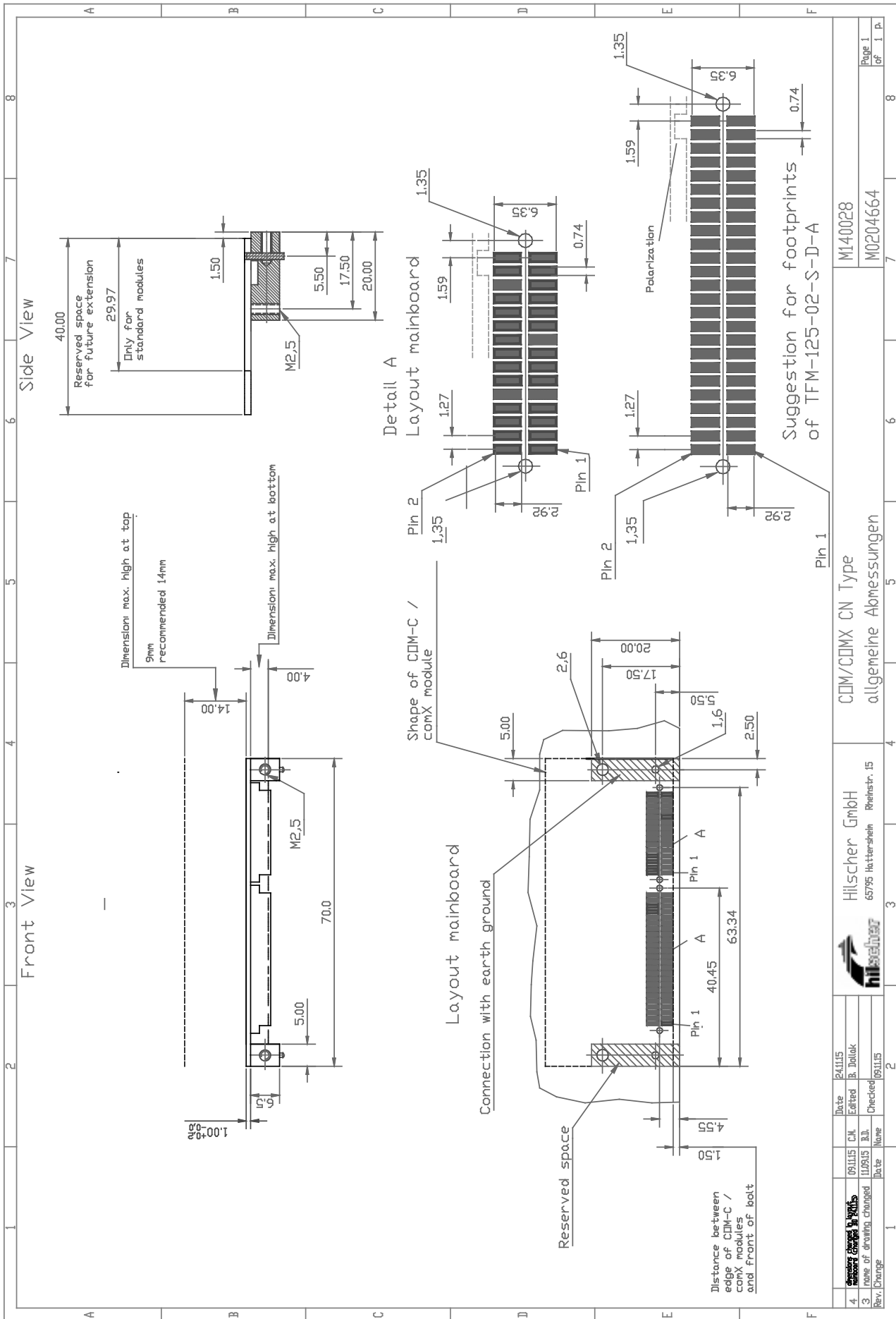


Figure 5: Mechanical dimension of COMX-CN-XXX



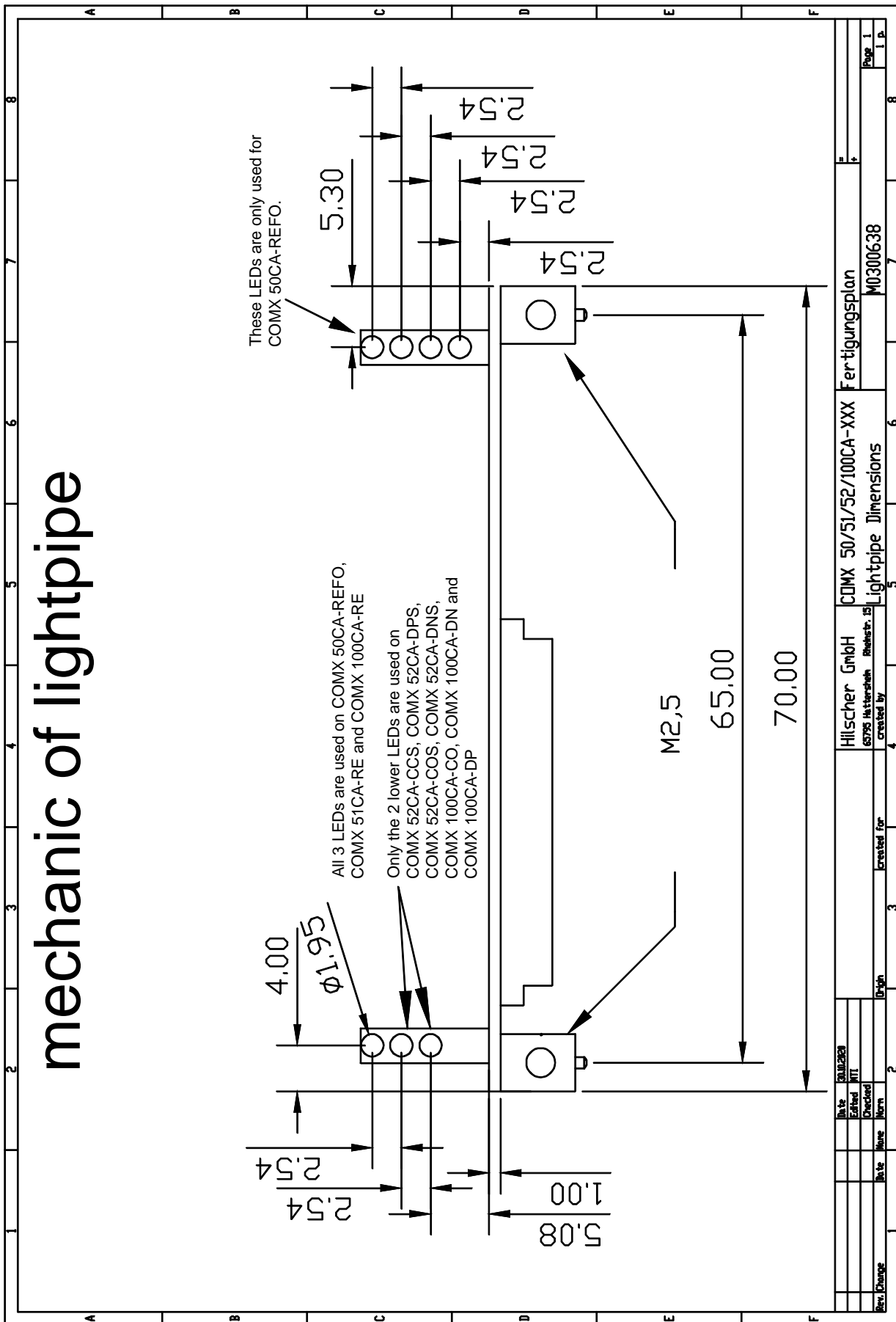


Figure 6: Mechanical dimension of light pipe of COMX 51/52/100CA-XXX

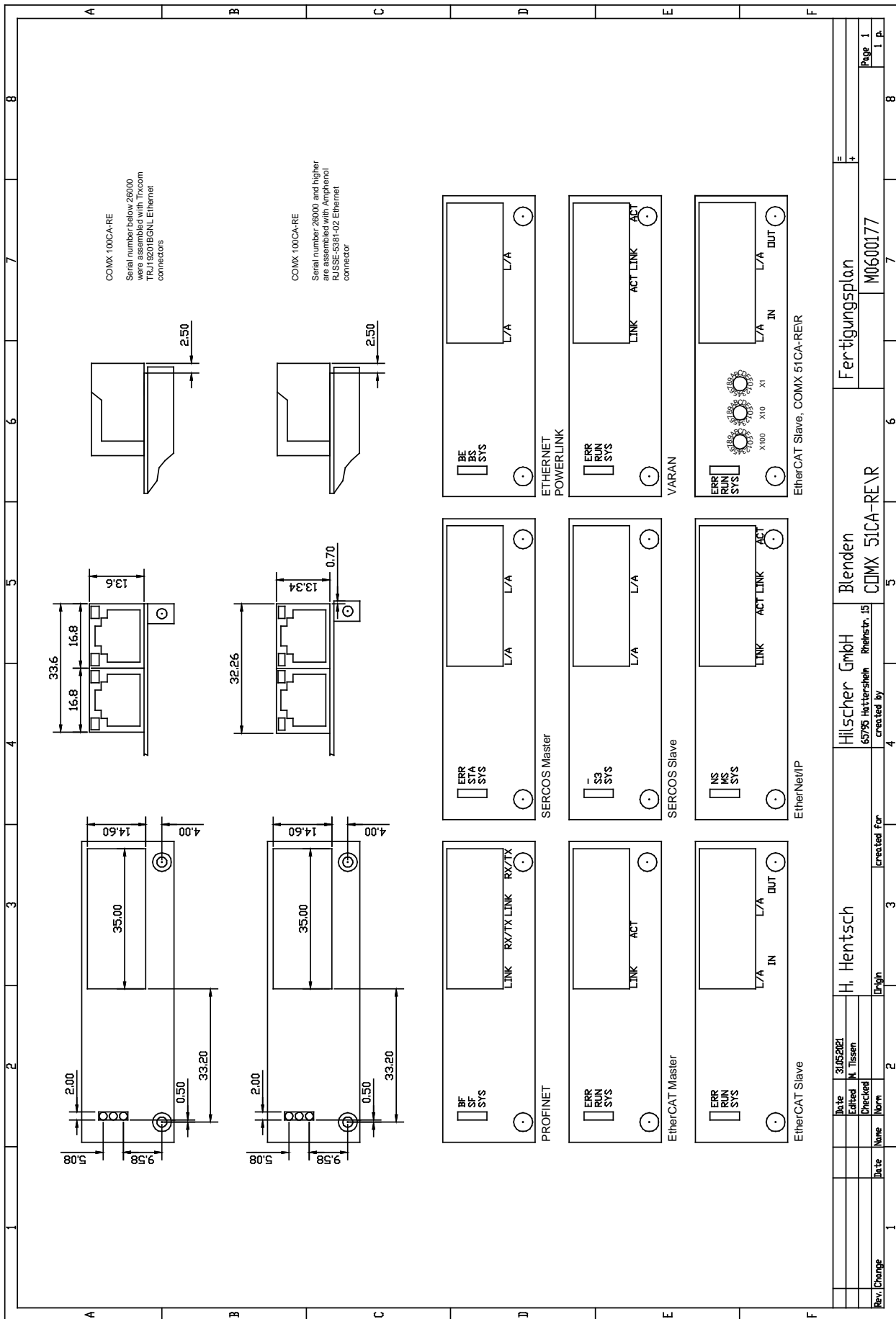


Figure 7: Mechanical dimension of cover and connector of COMX 51/100CA-RE and COMX 51CA-REVR



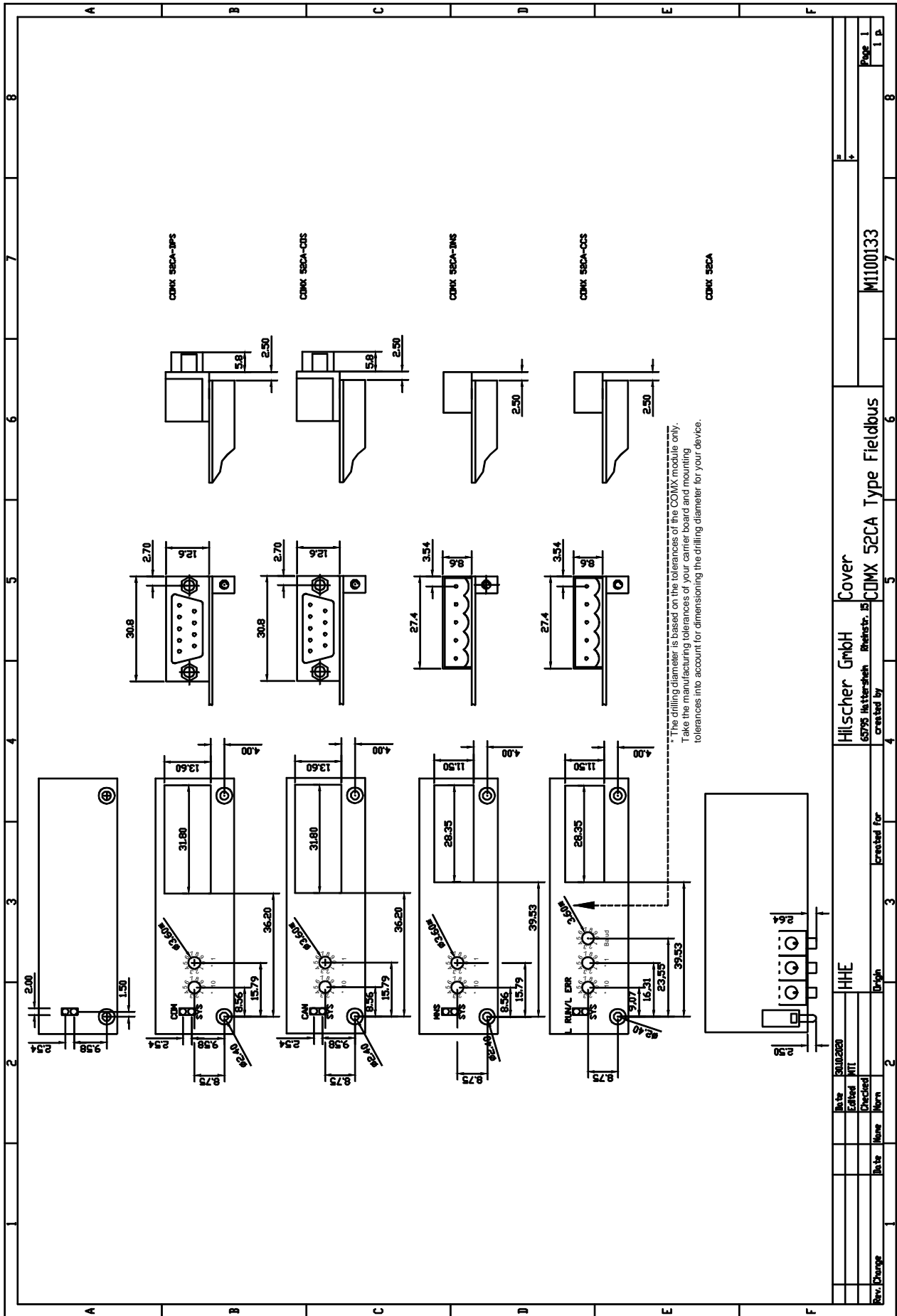
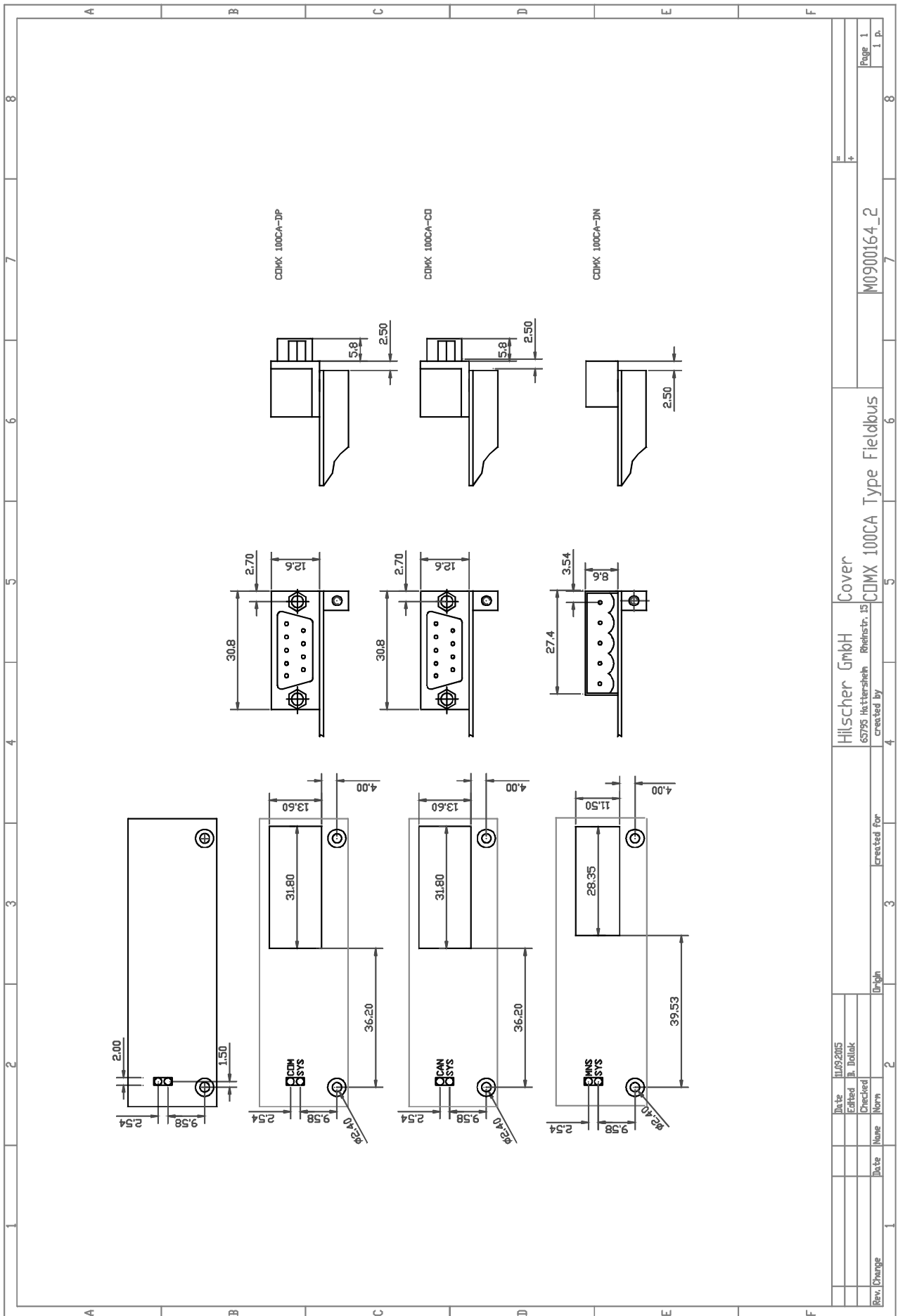


Figure 9: Mechanical dimension of cover and connector of COMX 52CA-XXX (Fieldbus)



|           |  |            |  |              |  |                   |  |                          |  |        |  |
|-----------|--|------------|--|--------------|--|-------------------|--|--------------------------|--|--------|--|
| Date      |  | 11.09.2015 |  | Created for  |  | Cover             |  | M0900164_2               |  | Page 1 |  |
| Edited by |  | J. Dalink  |  | Created by   |  | Hilscher GmbH     |  | CDMX 100CA Type Fieldbus |  | 8      |  |
| Checked   |  |            |  | Rheinstr. 15 |  | 65795 Hattersheim |  |                          |  | I.P.   |  |
| Name      |  |            |  | created by   |  |                   |  |                          |  | 1      |  |
| Date      |  |            |  | Length       |  |                   |  |                          |  |        |  |

Figure 10: Mechanical dimension of cover and connector of COMX 100CA-XXX (Fieldbus)

## 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](http://www.fjh.de)  
 Email: [info@fjh.de](mailto: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](http://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<br>Grid 5.08 mm | i.e. PHOENIX Contact<br>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<br>Grid 5.08 mm | i.e. PHOENIX Contact<br>MSTBA2,5/5-G-AU     |

Table 9: Connector types

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



### 2.3.1 Storage and contact reliability of host-side connector

For the host-side connectors used in the comX communication modules (Samtec Types SFC-115-T2-L-D-A-K-TR and SFC-125-T2-L-D-A-K-TR), the following applies concerning storage stability and long-term immunity against contact failure:

- Hilscher only uses highly reliable connectors in the comX modules. The supplier of the connector warrants a minimum expected storage time of 5 years without any loss of spring tension when the connectors have been mounted. According to its general terms and conditions, Hilscher assures this warranted storage time to you.
- In order to preserve the spring tension and to improve the immunity against contact failure of the host-side connectors, the following storage conditions are recommended:
  - Storage in dry package such as ESD bags which additionally can be heat-sealed.
  - Alternatively: Controlled storage at a temperature of max. 25 °C and 50 % relative humidity.



## 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.

---

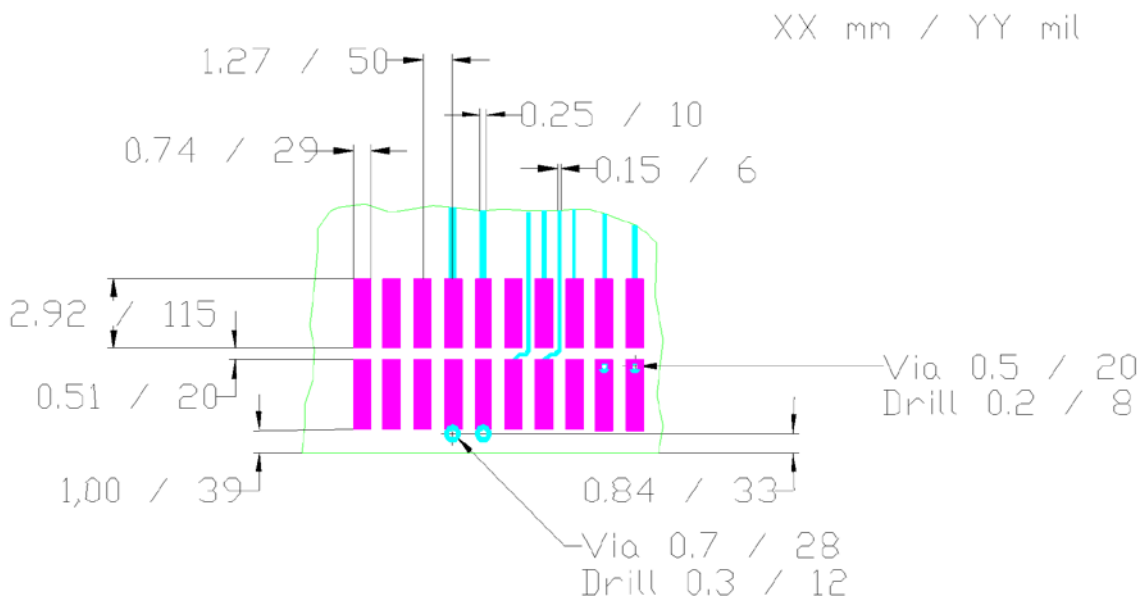


Figure 12: How to layout the signals at the connectors X1 and X2

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

| COM        | Type                             | Left Side    | Right Side     |
|------------|----------------------------------|--------------|----------------|
| COMX 51CA  | RE, RE\R                         | COM-CA-B20X5 | COM-CA-B31,5X5 |
| COMX 51CN  | RE                               | COM-CA-B20X5 | COM-CA-B20X5   |
| COMX 52CA  | COS, DNS, DPS                    | COM-CA-B20X5 | COM-CA-B24X5   |
|            | CCS                              | COM-CA-B20X5 | COM-CA-B20X5   |
| COMX 52CN  | CCS, COS, DNS, DPS               | 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 10: Usage of bolt for COMX modules

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

| Drawing  | Title                                       | Page |
|----------|---|------|
| M0100084 | Mechanical dimension of bolt COM-CA-B20X5   | 27   |
| M0600121 | Mechanical dimension of bolt COM-CA-B31,5X5 | 28   |
| M0900102 | Mechanical dimension of bolt COM-CA-B24X5   | 29   |

Table 11: Drawings of bolts (Overview)

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

| Drawing  | Title  | Page |
|----------|--|------|
| M0200402 | Mechanical dimension how to assemble COM-CA-XXX on the motherboard | 30   |

Table 12: Drawings of assembled bolt (Overview)

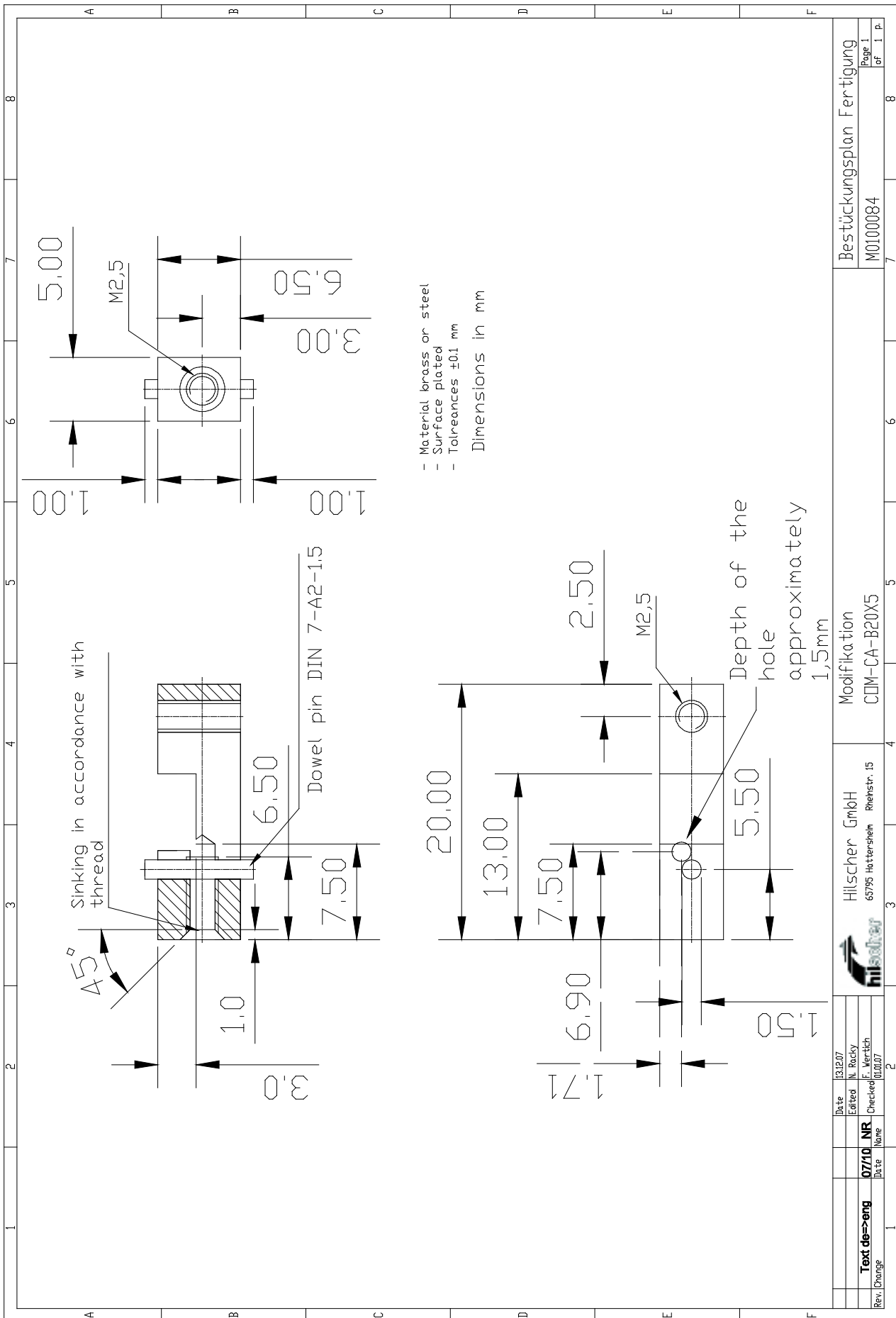


Figure 13: Mechanical dimension of Bolt COM-CA-B20X5

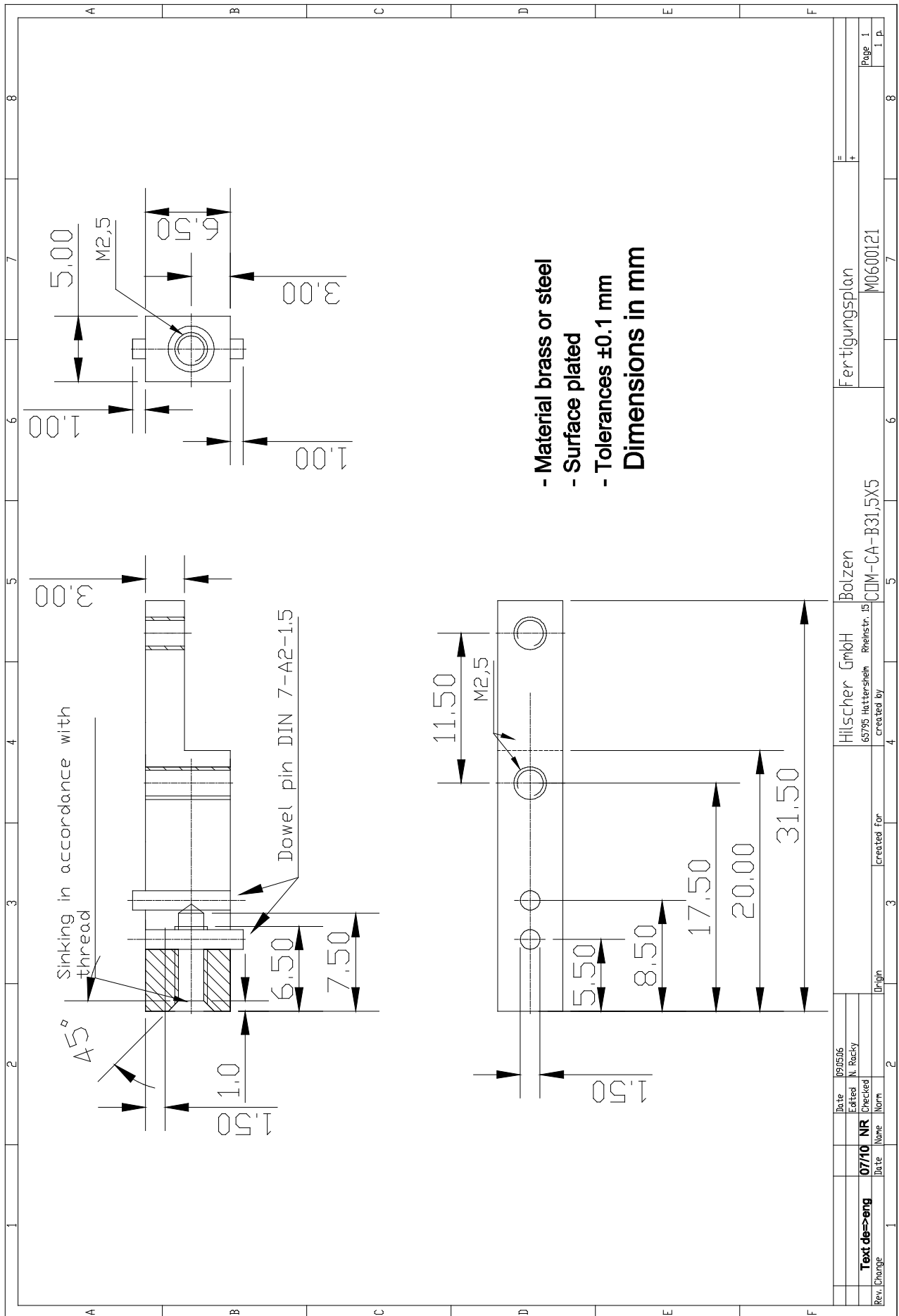


Figure 14: Mechanical dimension of Bolt COM-CA-B31,5X5

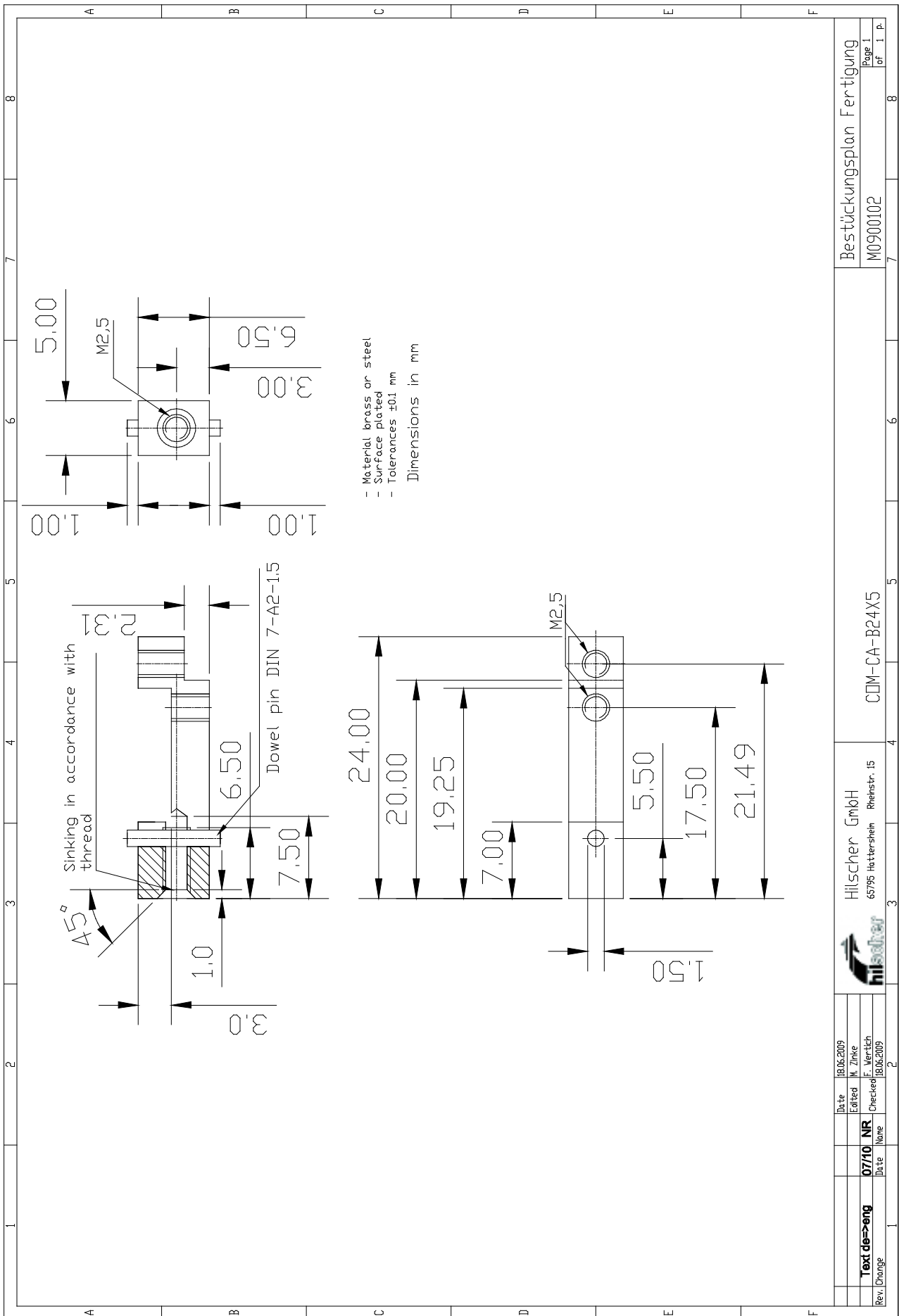
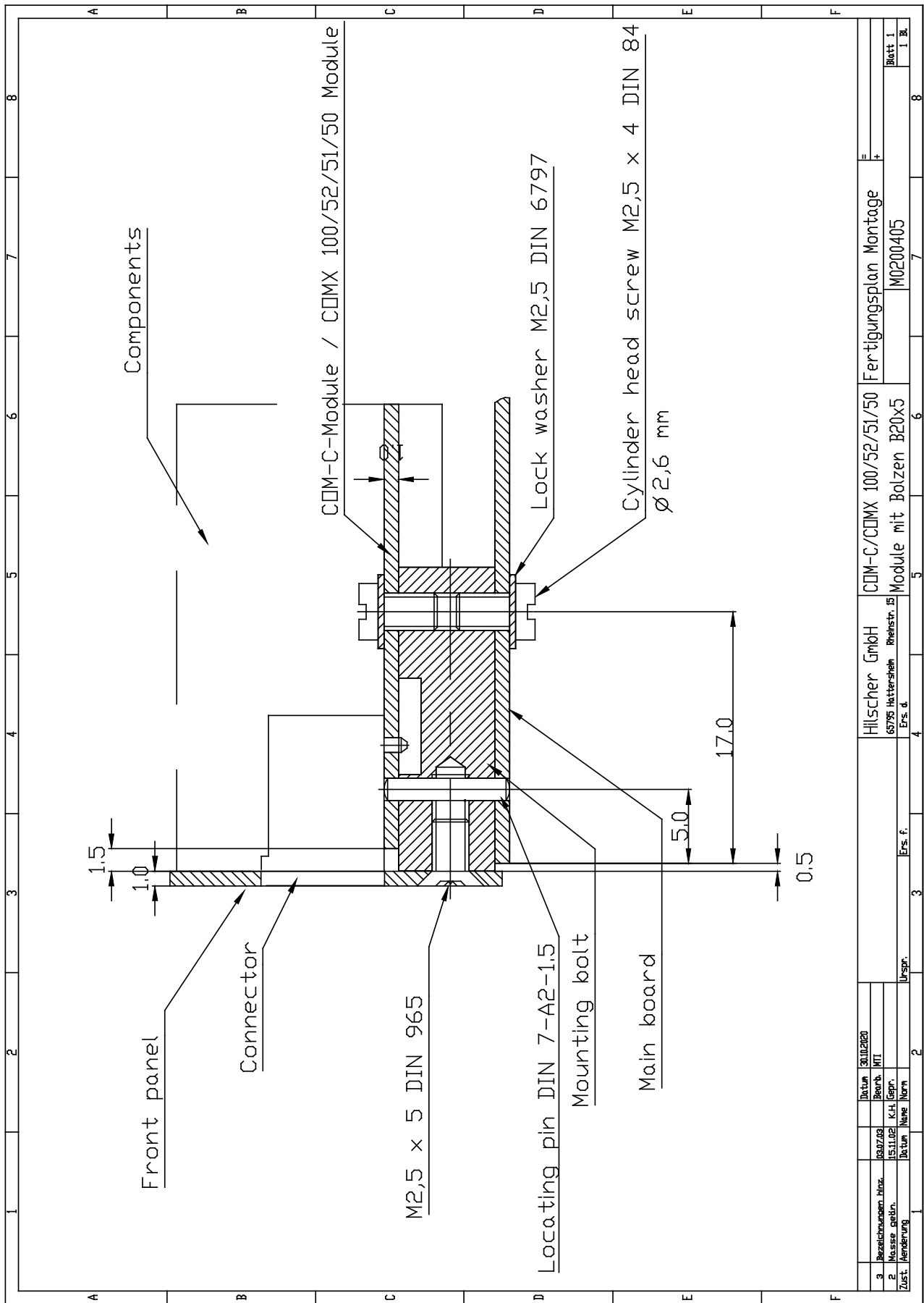


Figure 15: Mechanical dimension of Bolt COM-CA-B24X5



## 2.5 Material recommendation for the faceplate

For achieving good emission and immunity behavior of your device under construction into which the COMX module is integrated, we urgently recommend to use metal as material for the covering faceplate. Do not use plastics!

## 2.6 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 17: Example matrix code label of COMX modules

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

## 2.7 Meaning of the address switch

### 2.7.1 PROFIBUS DP Slave

#### COMX 52CA-DPS and COMX 52CN-DPS

The following table shows the meaning of the address switch for COMX 52.

| PROFIBUS DP Slave                            | Station address                                 |                         |
|--|---|-------------------------|
|  |   |                         |
|  | <b>Station address = Value * 10 + Value * 1</b> |                         |
| Value range for Station address:<br>0 ... 99 | 0 ... 9 = valid address                         | 0 ... 9 = valid address |

Table 13: Meaning of the address switch of COMX 52CA-DPS and COMX 52CN-DPS

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

## 2.7.2 CANopen Slave

### COMX 52CA-COS and COMX 52CN-COS

The following table shows the meaning of the address switch for COMX 52.

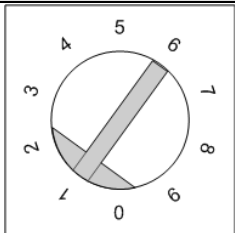
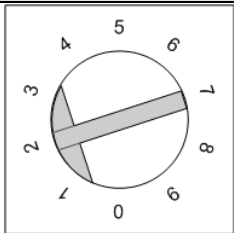
| CANopen Slave                             | Node address  |   |
|---|---|---|
|   |  |  |
| <b>Node address =</b>                     | <b>Value * 10</b>   | <b>+ Value * 1</b>  |
| Value range for node address:<br>0 ... 99 | 0 ... 9 = valid address   | 0 ... 9 = valid address   |

Table 14: Meaning of the address switch of COMX 52CA-COS and COMX 52CN-COS

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

## 2.7.3 DeviceNet Slave

### COMX 52CA-DNS and COMX 52CN-DNS

The following table shows the meaning of the address switch for COMX 52.

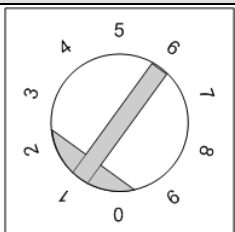
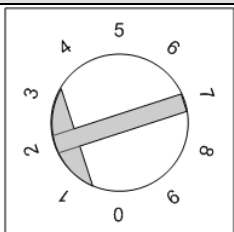
| DeviceNet Slave                     | MAC ID  |   |
|-------------------------------------|---|---|
|                                     |  |  |
| <b>MAC ID =</b>                     | <b>Value * 10</b>   | <b>+ Value * 1</b>  |
| Value range for MAC ID:<br>0 ... 63 | 0 ... 6 = valid address<br>7, 8, 9 = invalid address, error                         | 0 ... 9 = valid address   |

Table 15: Meaning of the address switch of COMX 52CA-DNS and COMX 52CN-DNS

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



## 2.7.4 CC-Link Slave

### COMX 52CA-CCS and COMX 52CN-CCS

The following table shows the meaning of the address and baud rate switches for COMX 52.

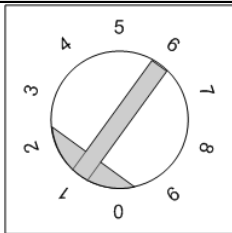
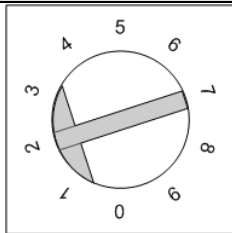
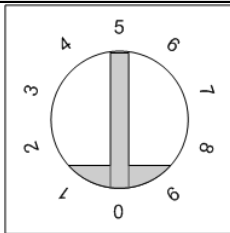
| CC-Link Slave                             | Station address   |   | Baud rate  |
|---|---|---|--|
|   |  |  |                         |
| <b>Station address =</b>                  | <b>Value * 10</b>   | <b>+</b>  | <b>Value * 1</b>   |
| Value range for Station address: 1 ... 64 | 0 ... 6 = valid address<br>7, 8, 9 = invalid address, error                       |   | 0, 1, ..., 8, 9 = valid address  |
|   |   |   | 0 = 156 kBaud<br>1 = 625 kBaud<br>2 = 2,5 MBaud<br>3 = 5 MBaud<br>4 = 10 MBaud<br>5 ... 9 = Invalid, error |

Table 16: Meaning of the address and baud rate switch of COMX 52CA-CCS and COMX 52CN-CCS

Example: For station address 12 set the left switch to 1 and the middle switch to 2. For baud rate 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 17: Value range for station address depending on number of stations

## 2.7.5 EtherCAT Slave

### COMX 51CA-RE\R

The following table shows the meaning of the address switches for COMX 51CA-RE\R.

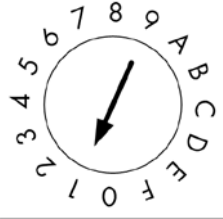
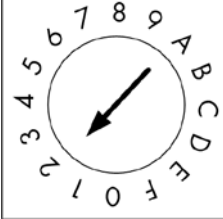
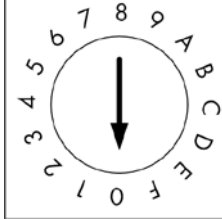
| EtherCAT Slave                                 | Station address  |   |  |
|--|--|---|--|
|  |  <p data-bbox="384 607 630 636">Address switch X100</p> |  <p data-bbox="735 607 981 636">Address switch X10</p> |  <p data-bbox="1086 607 1332 636">Address switch X1</p> |
|  | <b>Station address = Value * 256 + Value * 16 + Value * 1</b>  |   |  |
| Value range for Station address:<br>1 ... 4095 | 0, 1, ..., E, F = valid address  | 0, 1, ..., E, F = valid address   | 0, 1, ..., E, F = valid address  |

Table 18: Meaning of the address switch of COMX 51CA-RE\R

Example: For station address 288 (corresponding to 0x120) set the left switch to 1, the middle switch to 2 and the right switch to 0.

## 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 pin assignment of the system connector.

#### 3.1.1 Host interface overview: Dual-port memory sizes and modes

The following table lists the dual-port memory size and the supported dual-port memory modes for the different COMX modules.

| Module          | Fieldbus / Protocol                | Dual-port memory size | Parallel mode | Serial mode |
|-----------------|------------------------------------|-----------------------|---------------|-------------|
| <b>COMX 51</b>  |                                    |                       |               |             |
| COMX 51CA-RE    | Real-time Ethernet Slave           | 16 KByte              | yes           | yes         |
| COMX 51CA-RE\R  | Real-time Ethernet Slave           |                       | yes           | yes         |
| COMX 51CN-RE    | Real-time Ethernet Slave           |                       | yes           | yes         |
| <b>COMX 52</b>  |                                    |                       |               |             |
| COMX 52CA-COS   | CANopen Slave                      | 8 KByte               | yes           | yes         |
| COMX 52CA-CCS   | CC-Link Slave                      |                       | yes           | yes         |
| COMX 52CA-DPS   | PROFIBUS DP Slave                  |                       | yes           | yes         |
| COMX 52CA-DNS   | DeviceNet Slave                    |                       | yes           | yes         |
| COMX 52CN-COS   | CANopen Slave                      |                       | yes           | yes         |
| COMX 52CN-CCS   | CC-Link Slave                      |                       | yes           | yes         |
| COMX 52CN-DPS   | PROFIBUS DP Slave                  |                       | yes           | yes         |
| COMX 52CN-DNS   | DeviceNet Slave                    |                       | yes           | yes         |
| <b>COMX 100</b> |                                    |                       |               |             |
| COMX 100CA-CO   | CANopen Master or Slave            | 16 KByte              | yes           | -           |
| COMX 100CN-CO   | CANopen Master or Slave            |                       | yes           | -           |
| COMX 100CA-DN   | DeviceNet Master or Slave          |                       | yes           | -           |
| COMX 100CN-DN   | DeviceNet Master or Slave          |                       | yes           | -           |
| COMX 100CA-DP   | PROFIBUS DP Master or Slave        |                       | yes           | -           |
| COMX 100CN-DP   | PROFIBUS DP Master or Slave        |                       | yes           | -           |
| COMX 100CA-RE   | Real-time Ethernet Master or Slave |                       | yes           | -           |
| COMX 100CN-RE   | Real-time Ethernet Master or Slave |                       | yes           | -           |

Table 19: Dual-port memory size and supported modes of the comX modules

In general, the COMX module supports 14 address lines and thus a dual-port memory size of 16 KB.

In case of the COMX 52 modules even only the lowest 8 KB of the available address space are supported by the firmware. So not all address lines need to be used. Unused address lines should be equipped with a pull-down resistor of 560  $\Omega$ .

The following table explains the available possibilities:

| Modules        | Host address space | Connect to | Address lines to be connected with 560 $\Omega$ pull-down |
|----------------|--------------------|------------|---|
| COMX 52        | 8 KByte            | A0..A12    | A13   |
| COMX 52/51/100 | 16 KByte           | A0..A13    | none  |

Table 20: Possibilities for usage of dual-port memory

## 3.1.2 Host interface: Parallel or serial dual-port memory mode

### 3.1.2.1 COMX 100

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

#### How to set the 8 or 16 bit data width 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  $\Omega$  pull-down resistor.

---

**Note:** COMX 100 modules require a **power cycle** (hardware reset) to switch from 8 bit data width to 16 bit data width and vice versa, because the data width is read and set during boot of netX only.

---

### 3.1.2.2 COMX 51 and COMX 52

COMX 51 and COMX 52 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  $\Omega$  pull-down resistor.

---

**Note:** COMX 51 and COMX 52 modules require a **reset** (software reset) to switch from 8 bit data width to 16 bit data width and vice versa, because the data width is read and set during start up only. Alternatively a power cycle (hardware reset) can be used to switch the data width.

---

##### Serial Dual-Port Memory Mode

- A low signal at DPM\_DIRQn activates the serial dual-port memory mode (via a 680  $\Omega$  pull-down resistor). Pin DPM\_SIRQn: let the input open.

Signals DPM\_DIRQn and DPM\_SIRQn have a pull-up resistor of 4,7 k $\Omega$  on the COMX 51 or 52 Module.

---

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

---

### 3.1.3 COMX pin assignment of the system bus connector X1 – Parallel mode

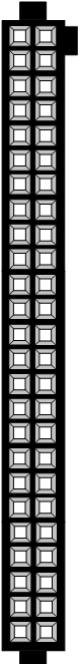
| X1   | Pin | Signal  | COMX 51, PAD type | COMX 52, PAD type | COMX 100, PAD type | Symbol               | Type  |
|--|-----|---|-------------------|-------------------|--------------------|----------------------|---|
|  | 1   | Word Interface, active low  | IOD9              | IOD9              | IO18C              | DPM_SIRQn            | LVTTTL Input  |
|  | 2   | Bus high enable, active low   | IOU9              | IOU9              | IO18C              | DPM_BHEn             | LVTTTL Input  |
|  | 3   | Data line 15  | IOU9              | IOU9              | IO18C              | DPM_D15              | LVTTTL Input / Output   |
|  | 4   | Data line 14  | IOU9              | IOU9              | IO18C              | DPM_D14              | LVTTTL Input / Output   |
|  | 5   | Data line 13  | IOU9              | IOU9              | IO18C              | DPM_D13              | LVTTTL Input / Output   |
|  | 6   | Data line 12  | IOU9              | IOU9              | IO18C              | DPM_D12              | LVTTTL Input / Output   |
|  | 7   | Data line 11  | IOU9              | IOU9              | IO18C              | DPM_D11              | LVTTTL Input / Output   |
|  | 8   | Data line 10  | IOU9              | IOU9              | IO18C              | DPM_D10              | LVTTTL Input / Output   |
|  | 9   | Data line 9   | IOU9              | IOU9              | IO18C              | DPM_D9               | LVTTTL Input / Output   |
|  | 10  | Data line 8   | IOU9              | IOU9              | IO18C              | DPM_D8               | LVTTTL Input / Output   |
|  | 11  | Ground  |                   |                   |                    | GND                  |   |
|  | 12  | Power Supply  |                   |                   |                    | +3V3                 |   |
|  | 13  | Transmit Data, Serial line  |                   |                   | IOD6               | UART1_TXD            | LVTTTL Output   |
|  | 14  | Receive Data, Serial line   |                   |                   | IOD6               | UART1_RXD            | LVTTTL Input  |
|  | 15  | Request to Send, Serial line & SYNC0  | IODS6             |                   | IOD6               | UART1_RTSn/<br>SYNC0 | LVTTTL Output / SYNC Input / Output Signal<br>XC3_IO0 (Note 1, 2) |
|  | 16  | Clear to Send, Serial line & SYNC1  | IODS6             |                   | IOD6               | UART1_CTSn/<br>SYNC1 | LVTTTL Input / SYNC Input / Output Signal<br>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   | IODS6             |                   | IOD6               | UART0_RXD            | LVTTTL Input  |
|  | 20  | Transmit Data, Diagnostic line  | IODS6             |                   | IOD6               | UART0_TXD            | LVTTTL Output   |
|  | 21  | Reset, active low   |                   |                   | IO18C              | DPM_RESETn           | LVTTTL Input;<br>10 kΩ pull up at COMX                            |
|  | 22  | Busy, active low  | IOU9              |                   | IO18C              | DPM_BUSYn            | LVTTTL Output   |
|  | 23  | During operation: Interrupt, active low<br>COMX 51 and COMX 52 at start-up: Host mode selection | IOU9              | IOU9              | IO18C              | DPM_DIRQn            | During operation: LVTTTL Output<br>At start-up: LVTTTL Input      |

Table 21: COMX pin assignment of the system bus connector X1- Parallel DPM mode (Part 1)

| X1 | Pin | Signal                  | COMX 51,<br>PAD type | COMX 52,<br>PAD type | COMX 100<br>PAD type | Symbol  | Type                  |
|----|-----|-------------------------|----------------------|----------------------|----------------------|---------|-----------------------|
|    | 24  | Read, active low        | IOU9                 | IOU9                 | IO18C                | DPM_RDn | LVTTTL Input          |
|    | 25  | Write, active low       | IOU9                 | IOU9                 | IO18C                | DPM_WRn | LVTTTL Input          |
|    | 26  | Chip select, active low | IOU9                 | IOU9                 | IO18C                | DPM_CSn | LVTTTL Input          |
|    | 27  | Address line 13         | IOU9                 | IOU9                 | IO18C                | DPM_A13 | LVTTTL Input          |
|    | 28  | Address line 12         | IOU9                 | IOU9                 | IO18C                | DPM_A12 | LVTTTL Input          |
|    | 29  | Address line 11         | IOU9                 | IOU9                 | IO18C                | DPM_A11 | LVTTTL Input          |
|    | 30  | Address line 10         | IOU9                 | IOU9                 | IO18C                | DPM_A10 | LVTTTL Input          |
|    | 31  | Address line 9          | IOU9                 | IOU9                 | IO18C                | DPM_A9  | LVTTTL Input          |
|    | 32  | Address line 8          | IOU9                 | IOU9                 | IO18C                | DPM_A8  | LVTTTL Input          |
|    | 33  | Address line 7          | IOU9                 | IOU9                 | IO18C                | DPM_A7  | LVTTTL Input          |
|    | 34  | Address line 6          | IOU9                 | IOU9                 | IO18C                | DPM_A6  | LVTTTL Input          |
|    | 35  | Address line 5          | IOU9                 | IOU9                 | IO18C                | DPM_A5  | LVTTTL Input          |
|    | 36  | Address line 4          | IOU9                 | IOU9                 | IO18C                | DPM_A4  | LVTTTL Input          |
|    | 37  | Address line 3          | IOU9                 | IOU9                 | IO18C                | DPM_A3  | LVTTTL Input          |
|    | 38  | Address line 2          | IOU9                 | IOU9                 | IO18C                | DPM_A2  | LVTTTL Input          |
|    | 39  | Address line 1          | IOU9                 | IOU9                 | IO18C                | DPM_A1  | LVTTTL Input          |
|    | 40  | Address line 0          | IOU9                 | IOU9                 | IO18C                | DPM_A0  | LVTTTL Input          |
|    | 41  | Data line 7             | IOU9                 | IOU9                 | IO18C                | DPM_D7  | LVTTTL Input / Output |
|    | 42  | Data line 6             | IOU9                 | IOU9                 | IO18C                | DPM_D6  | LVTTTL Input / Output |
|    | 43  | Data line 5             | IOU9                 | IOU9                 | IO18C                | DPM_D5  | LVTTTL Input / Output |
|    | 44  | Data line 4             | IOU9                 | IOU9                 | IO18C                | DPM_D4  | LVTTTL Input / Output |
|    | 45  | Data line 3             | IOU9                 | IOU9                 | IO18C                | DPM_D3  | LVTTTL Input / Output |
|    | 46  | Data line 2             | IOU9                 | IOU9                 | IO18C                | DPM_D2  | LVTTTL Input / Output |
|    | 47  | Data line 1             | IOU9                 | IOU9                 | IO18C                | DPM_D1  | LVTTTL Input / Output |
|    | 48  | Data line 0             | IOU9                 | IOU9                 | IO18C                | DPM_D0  | LVTTTL Input / Output |
|    | 49  | Ground                  |                      |                      |                      | GND     |                       |
|    | 50  | Power Supply            |                      |                      |                      | +3V3    |                       |

Table 22: COMX pin assignment 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 <i>SYNC signals</i> on page 63 for details. |
| 2    | SYNC0 and SYNC1 are available on COMX 100CA-RE, COMX 100CN-RE, and COMX 51CA-RE only.                                      |

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

### 3.1.4 COMX pin assignment of the system bus connector X1 – Serial mode

The following table is valid for COMX 51 and COMX 52 Modules only and if the serial dual-port memory mode is active.

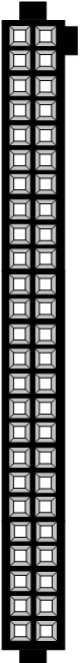
| X1   | Pin | Signal                                  | COMX 51<br>PAD type | COMX 52<br>PAD type | Symbol                | Type   |
|--|-----|---|---------------------|---------------------|-----------------------|--|
|  | 1   | reserved                                | IOD9                | IOD9                | reserved              | Note 3   |
|  | 2   | reserved                                | IOU9                | IOU9                | reserved              | Note 3   |
|  | 3   | reserved                                | IOU9                | IOU9                | reserved              | Note 3   |
|  | 4   | reserved                                | IOU9                | IOU9                | reserved              | Note 3   |
|  | 5   | reserved                                | IOU9                | IOU9                | SPM_SIRQn             | LVTTTL Output,<br>Note 4                                     |
|  | 6   | reserved                                | IOU9                | IOU9                | SPM_DIRQn             | LVTTTL Output,<br>Note 4                                     |
|  | 7   | Clock                                   | IOU9                | IOU9                | SPM_CLK               | LVTTTL Input   |
|  | 8   | Chip select, active low                 | IOU9                | IOU9                | SPM_CSn               | LVTTTL Input   |
|  | 9   | Master Out Slave In                     | IOU9                | IOU9                | SPM_MOSI              | LVTTTL Input   |
|  | 10  | Master In Slave Out                     | IOU9                | IOU9                | SPM_MISO              | LVTTTL Output  |
|  | 11  | Ground                                  |                     |                     | GND                   |  |
|  | 12  | Power Supply                            |                     |                     | +3V3                  |  |
|  | 13  | Transmit Data,<br>Serial line           | IODS6               | IODS6               | UART1_TXD             | LVTTTL Output  |
|  | 14  | Receive Data, Serial line               | IODS6               | IODS6               | UART1_RXD             | LVTTTL Input   |
|  | 15  | Request to Send,<br>Serial line & SYNC0 | IODS6               | IODS6               | UART1_RTSn /<br>SYNC0 | LVTTTL Output /<br>SYNC Output Signal<br>XC3_IO0 (Note 1, 2) |
|  | 16  | Clear to Send,<br>Serial line & SYNC1   | IODS6               | IODS6               | UART1_CTSn /<br>SYNC1 | LVTTTL Input /<br>SYNC Output Signal<br>XC3_IO1 (Note 1, 2)  |
|  | 17  | USB positive,<br>Diagnostic line        | USB                 | USB                 | USB+                  | USB  |
|  | 18  | USB negative,<br>Diagnostic line        | USB                 | USB                 | USB-                  | USB  |
|  | 19  | Receive Data,<br>Diagnostic line        | IODS6               | IODS6               | UART0_RXD             | LVTTTL Input   |
|  | 20  | Transmit Data,<br>Diagnostic line       | IODS6               | IODS6               | UART0_TXD             | LVTTTL Output  |
|  | 21  | Reset, active low                       |                     |                     | DPM_RESETh            | LVTTTL Input; 10 kΩ<br>pull up                               |
|  | 22  | reserved                                |                     |                     | reserved              | Note 3   |
|  | 23  | Host mode selection at<br>start-up      | IOU9                | IOU9                | DPM_DIRQn             | At start-up:<br>LVTTTL Input                                 |
|  | 24  | reserved                                | IOU9                | IOU9                | reserved              | Note 3   |
|  | 25  | reserved                                | IOU9                | IOU9                | reserved              | Note 3   |
|  | 26  | reserved                                | IOU9                | IOU9                | reserved              | Note 3   |

Table 24: COMX pin assignment of the system bus connector X1- Serial DPM mode COMX 51/COMX 52 (Part 1)

| X1 | Pin | Signal       | COMX 51<br>PAD type | COMX 52<br>PAD type | Symbol   | Type   |
|----|-----|--------------|---------------------|---------------------|----------|--------|
|    | 27  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 28  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 29  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 30  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 31  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 32  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 33  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 34  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 35  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 36  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 37  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 38  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 39  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 40  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 41  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 42  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 43  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 44  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 45  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 46  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 47  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 48  | reserved     | IOU9                | IOU9                | reserved | Note 3 |
|    | 49  | Ground       |                     |                     | GND      |        |
|    | 50  | Power Supply |                     |                     | +3V3     |        |

Table 25: COMX pin assignment of the system bus connector X1 – Serial DPM Mode COMX 51/COMX 52 (Part 2)

| Note | Information  |
|------|--|
| 1    | Support of SYNC signals depends on the functionality of the used firmware. See <i>SYNC signals</i> on page 63 for details. |
| 2    | SYNC0 and SYNC1 are available on COMX 100CA-RE, COMX 100CN-RE, and COMX 51CA-RE only.                                      |
| 3    | External wiring: Pin unconnected   |
| 4    | Not supported  |

Table 26: Notes for COMX pin assignment of the system bus connector X1



### 3.1.5 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                      |
| 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 27: PAD type explanation

**Schematic view of netX pad types**

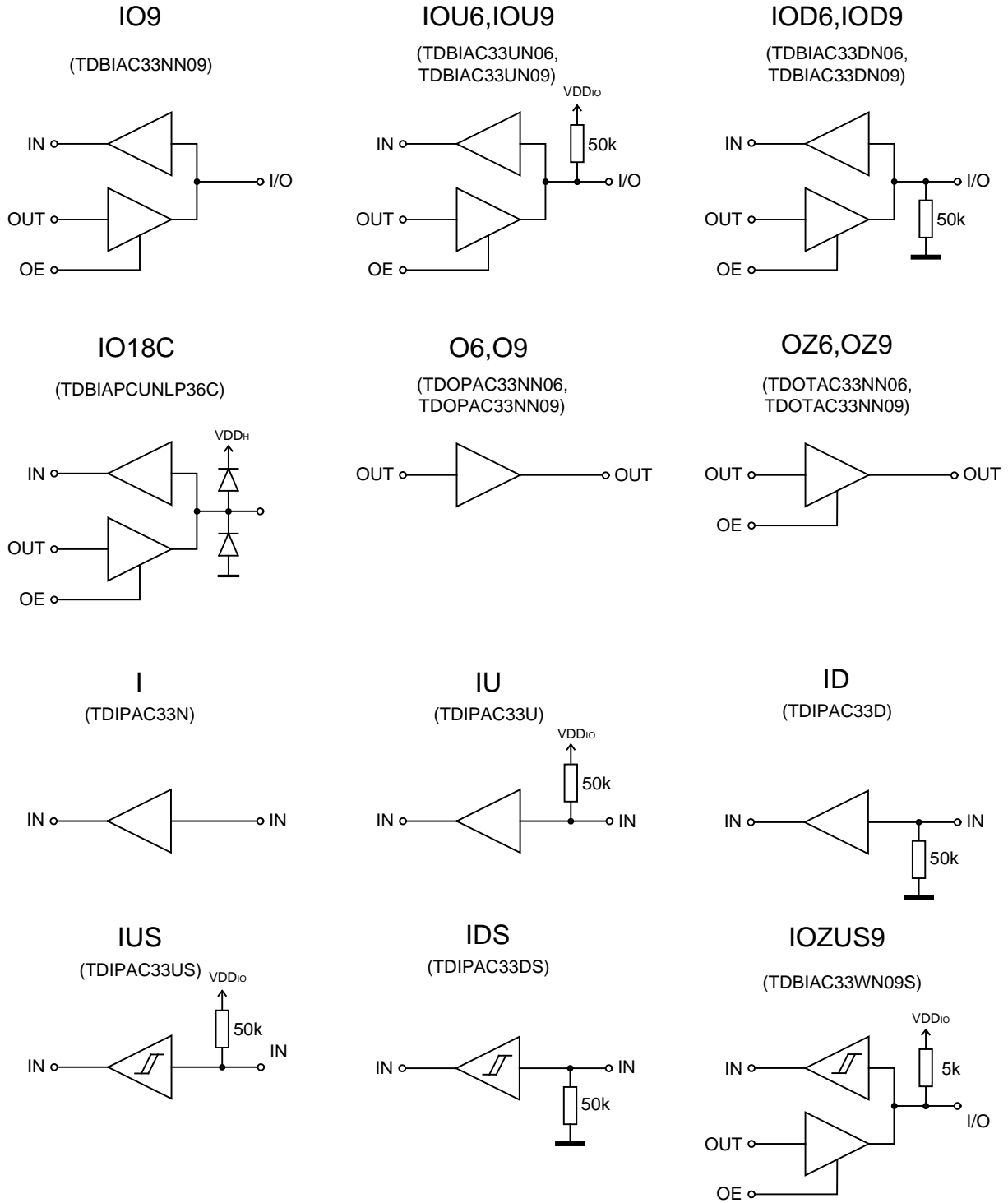


Figure 18: Schematic view of netX pad types

### 3.1.6 Signal overview and pin assignment of the fieldbus connector X2 on COMX CN

#### 3.1.6.1 Fieldbus connector X2 for CC-Link Slave

Fieldbus connector X2 for COMX 52CN-CCS

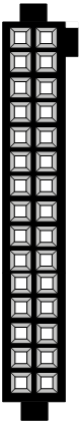
| X2   | Pin | Signal                              | Symbol   | Type                  | Pin at fieldbus connector COMBICON 5-pin |
|--|-----|-------------------------------------|----------|-----------------------|--|
|  | 1   |                                     |          |                       |  |
|  | 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      | LVTTTL 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 28: Fieldbus connector X2 for CC-Link Slave

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

Table 29: Notes for fieldbus connector X2 for CC-Link Slave

### 3.1.6.2 Fieldbus connector X2 for CANopen-Master/-Slave

Fieldbus connector X2 for COMX 52CN-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  |                                  |         |                      |  |

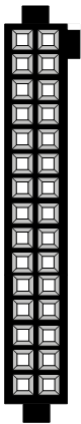


Table 30: Fieldbus connector X2 for CANopen-Master/-Slave

| 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 31: Notes for fieldbus connector X2 for CANopen-Master/-Slave

### 3.1.6.3 Fieldbus Connector X2 for DeviceNet-Master/-Slave

Fieldbus connector X2 for COMX 52CN-DNS and COMX 100CN-DN

| X2 | Pin | Signal                                 | Symbol  | Type                  | Pin at Fieldbus connector COMBICON 5-pin |
|----|-----|--|---------|-----------------------|--|
|    | 1   |  |         |                       |  |
|    | 2   |  |         |                       |  |
|    | 3   |  |         |                       |  |
|    | 4   |  |         |                       |  |
|    | 5   |  |         |                       |  |
|    | 6   |  |         |                       |  |
|    | 7   | CAN, Receive Data                      | CAN_RX1 | LVTTTL Input          | Note 1                                   |
|    | 8   |  |         |                       |  |
|    | 9   | CAN, Transmit Data                     | CAN_TX1 | LVTTTL Output         | Note 1                                   |
|    | 10  |  |         |                       |  |
|    | 11  | CAN, Power Fail                        | CAN_PF1 | LVTTTL 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     | LVTTTL 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  |

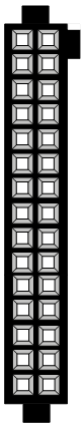


Table 32: Fieldbus connector X2 for DeviceNet-Master/-Slave

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

Table 33: Notes for fieldbus connector X2 for DeviceNet-Master/-Slave

### 3.1.6.4 Fieldbus Connector X2 for PROFIBUS-Master/-Slave

Fieldbus connector X2 for COMX 52CN-DPS and COMX 100CN-DP

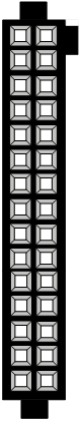
| X2   | Pin | Signal                                 | Symbol    | Type                  | Pin at Fieldbus connector DSub-9, female |
|--|-----|--|-----------|-----------------------|--|
|  | 1   | PROFIBUS, Receive Data                 | PB_RX     | LVTTTL Input          | Note 1                                   |
|  | 2   |  |           |                       |  |
|  | 3   | PROFIBUS, Transmit Data                | PB_TX     | LVTTTL Output         | Note 1                                   |
|  | 4   |  |           |                       |  |
|  | 5   | PROFIBUS, Enable Bus Driver            | PB_ENB    | LVTTTL 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       | LVTTTL 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    | LVTTTL                | 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 34: Fieldbus connector X2 for PROFIBUS-Master/-Slave

| Note | Information   |
|------|---|
| 1    | LVTTTL Signals can only be used without the hardware interface on the COMX. Ask for special customer version. |
| 2    | Green LED for COMX 52CN-DPS and COMX 100CN-DP   |

Table 35: Notes for fieldbus connector X2 for PROFIBUS-Master/-Slave

### 3.1.6.5 Fieldbus Connector X2 for Real Time Ethernet

Fieldbus connector X2 for COMX 51CN-RE and COMX 100CN-RE:

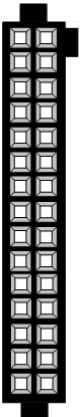
| X2   | Pin | Signal                                | Symbol     | Type                  | Pin at Fieldbus connector RJ45 |
|--|-----|---------------------------------------|------------|-----------------------|--------------------------------|
|  | 1   | Link0-LED Cathode green, active low   | LINK0_CGn  | 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        | LVTTTL Input / Output |                                |
|  | 28  | not connected                         |            |                       |                                |
|  | 29  | not connected                         |            |                       |                                |
|  | 30  | not connected                         |            |                       |                                |

Table 36: 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
- J8064D628ANL, Pulse

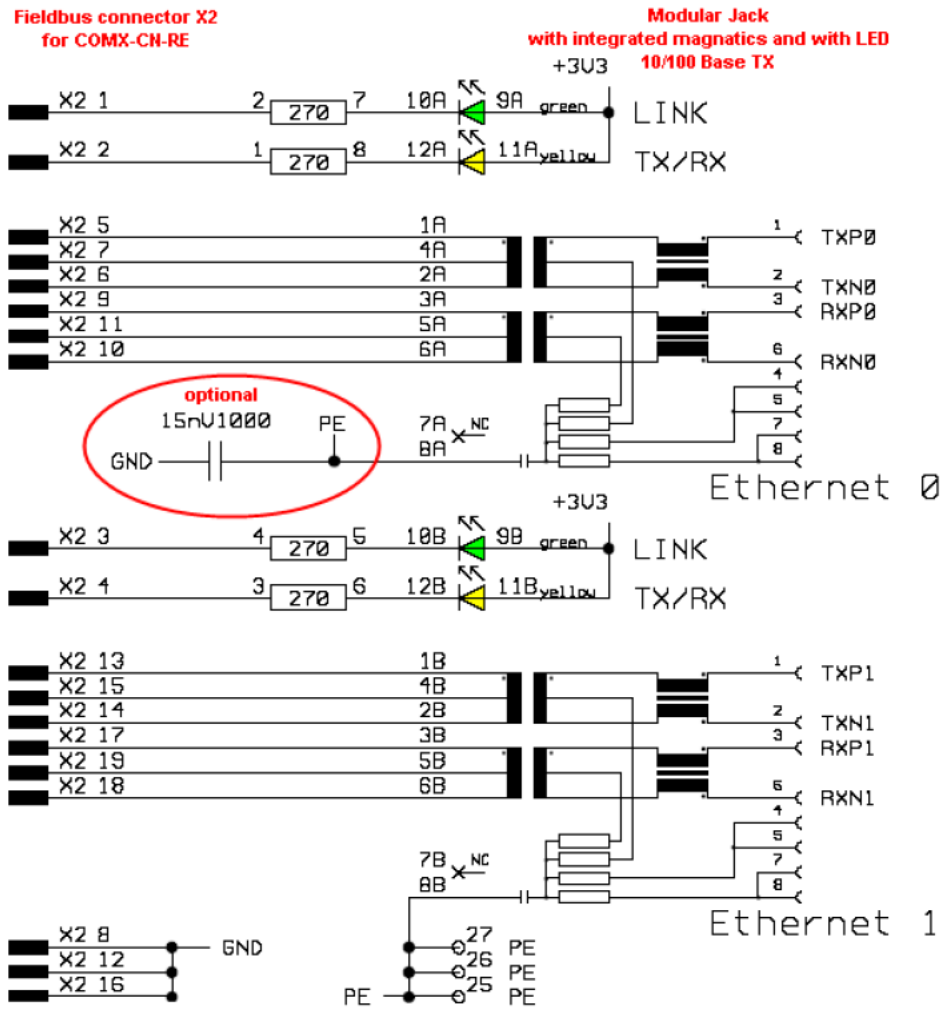


Figure 19: Ethernet connection COMX-CN-RE

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

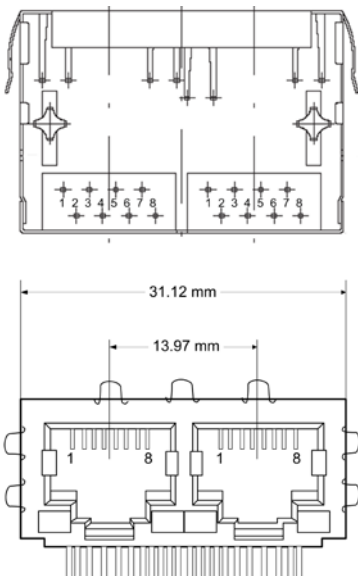


Figure 20: Ethernet connector example (ERNI 203313)



## 3.1.7 Common signals of the host interface

### 3.1.7.1 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  $\pm 5\%$  (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.

The maximum current depends on comX module type. For specific current values see section Technical data on page 64.

### 3.1.7.2 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  $\mu$ s.

---

**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.

---

## 3.1.8 Signals of the host interface – Parallel dual-port memory mode

### 3.1.8.1 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.

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 *Host interface overview: Dual-port memory sizes and modes* on page 35. 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 100) respectively 9 mA (COMX 51, COMX 52).

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.

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

### 3.1.8.2 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 37: Function table of the 16 bit decode logic

### 3.1.8.3 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.

### 3.1.8.4 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 51 and COMX 52  
and a 10 kΩ pull-up resistor for COMX 100.

---

### 3.1.8.5 BUSY line to the host system

The signal BUSY<sub>n</sub> 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.**

**This does not affect COMX51 and COMX52 modules!**

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

---

**Note 2:** The COMX has a 10 kΩ pull-up resistor on board for the output line DPM\_BUSY<sub>n</sub>

---

### 3.1.8.6 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\_BUSY<sub>n</sub> 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\_CS<sub>n</sub> and read DPM\_RD<sub>n</sub> or write DPM\_WR<sub>n</sub> 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.

### 3.1.8.7 Timing diagram parallel dual-port memory interface

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

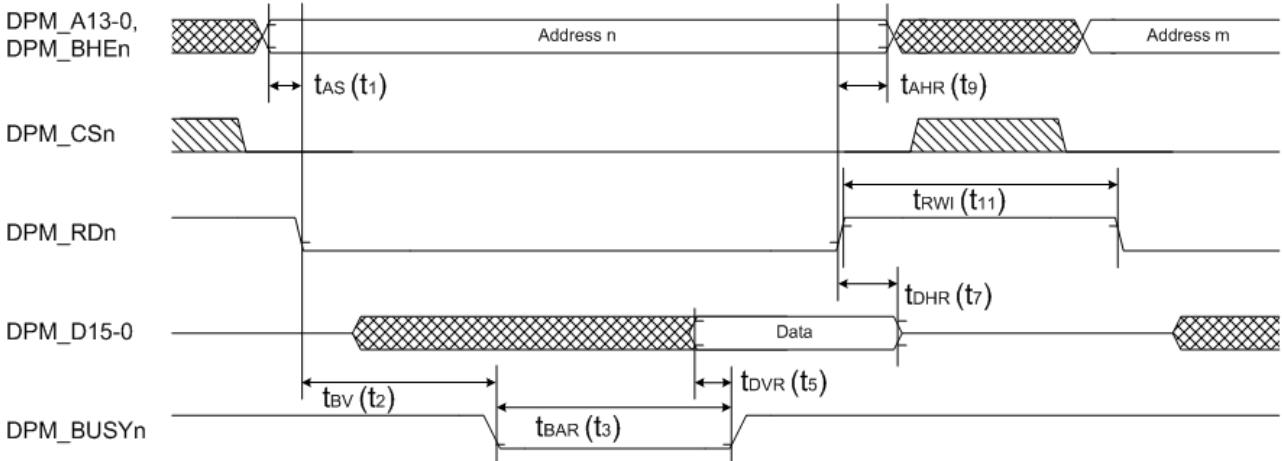


Figure 21: COMX timing diagram for read access

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

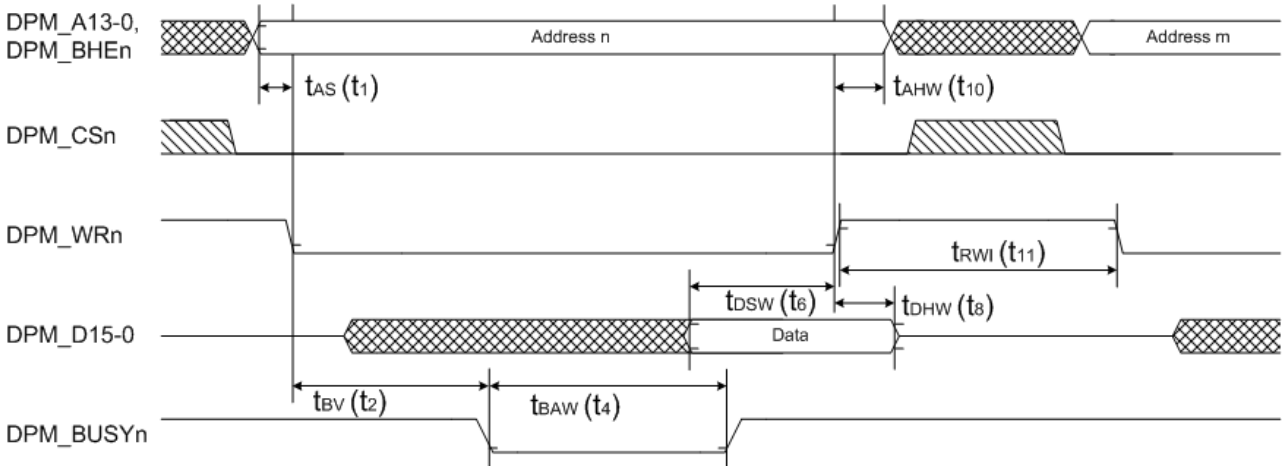


Figure 22: COMX timing diagram for write access

Description and values are on the next page.

The following table gives the values for the timing parameters for COMX 51 modules using the netX 51 chip, for COMX 52 modules using the netX 52 chip and for COMX 100 using the netX 100 chip. For exchangeability of COMX 51, COMX 52 and COMX 100 communication modules use the values of column **Common** of Table 38.

| Symbol          |                       | Description   | COMX 100<br>netX 100 | COMX 51<br>netX 51 | COMX 52<br>netX 52 | Common  |
|-----------------|-----------------------|---|----------------------|--------------------|--------------------|---------|
| t <sub>1</sub>  | t <sub>AS min.</sub>  | Minimum address setup time  | 0 ns                 | 0 ns               | 0 ns               | 2 ns    |
| t <sub>2</sub>  | t <sub>BV max.</sub>  | Maximum Time from cycle start until BUSY <sub>n</sub> signal is valid                   | 30 ns                | 5,7 ns             | 5,7 ns             | 40 ns   |
| t <sub>3</sub>  | t <sub>BAR typ.</sub> | <b>Typical</b> BUSY active time (read access)<br>See note 2                             | 80 ns                | -                  | -                  | -       |
|                 | t <sub>BAR max.</sub> | Maximum BUSY active time (read access)<br><b>See important note 1</b>                   | -                    | 68 ns              | 68 ns              | -       |
| t <sub>4</sub>  | t <sub>BAW min.</sub> | Minimum BUSY active time (write access)   | 0 ns                 | 0 ns               | 0 ns               | 0 ns    |
|                 | t <sub>BAW max.</sub> | Maximum BUSY active time (write access)<br><b>See important note 1</b>                  | -                    | 68 ns              | 68 ns              | -       |
| t <sub>5</sub>  | t <sub>DVR min.</sub> | Minimum Time between valid data bus signals and rising edge of BUSY <sub>n</sub> signal | 5 ns                 | 7,8 ns             | 7,8 ns             | 5 ns    |
| t <sub>6</sub>  | t <sub>DSW min.</sub> | Minimum setup time for write data   | 25 ns                | 12.8 ns            | 12.8 ns            | 25 ns   |
| t <sub>7</sub>  | t <sub>DHR min.</sub> | Minimum read data hold time   | 0 ns                 | 2.1 ns             | 2.1 ns             | 0 ns    |
| t <sub>8</sub>  | t <sub>DHW min.</sub> | Minimum hold time for write data  | 0 ns                 | 2.8 ns             | 2.8 ns             | 2.8 ns  |
| t <sub>9</sub>  | t <sub>AHR min.</sub> | Minimum address hold time   | 0 ns                 | 0 ns               | 0 ns               | 0 ns    |
| t <sub>10</sub> | t <sub>AHW min.</sub> | Minimum address hold time   | 0 ns                 | 2.9 ns             | 2.9 ns             | 2.9 ns  |
| t <sub>11</sub> | t <sub>RWI</sub>      | Minimum inactive time for RD <sub>n</sub> or WR <sub>n</sub>                            | 10 ns                | 12.5 ns            | 12.5 ns            | 12.5 ns |

Table 38: 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\_BUSY<sub>n</sub> signal, otherwise this results in wrong data read from the dual-port memory or dual-port memory write accesses are ignored. This does not affect COMX51 und COMX52!**

- The maximum value for accesses cannot be specified.
- For maximum performance, the DPM\_BUSY<sub>n</sub> signal must always be evaluated by the host CPU.
- If you use a host CPU that cannot use the DPM\_BUSY<sub>n</sub> signal, then contact our technical support.

**Note 2:** The value for t<sub>BAR typ.</sub> (t<sub>3 typ.</sub>) depends on the used firmware/application on the netX.

**Note 3:** DPM\_BHE<sub>n</sub> is only used for 16 bit interface.

### 3.1.8.8 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.

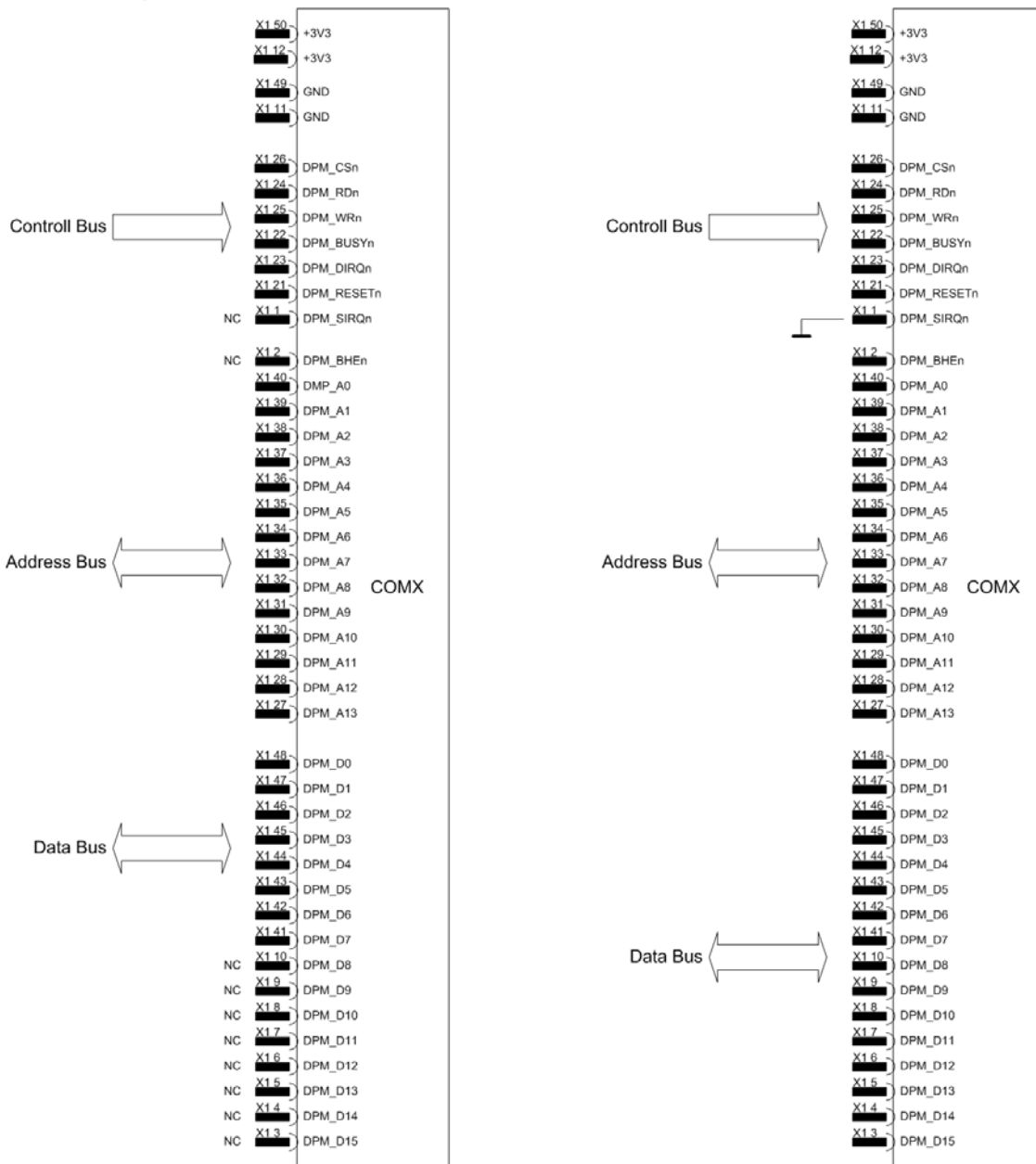


Figure 23: Interface with 8-bit data bus - Interface with 16-bit interface

| 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 39: Function table of decode logic

### 3.1.9 Signals of the host interface – Serial dual-port memory mode

The COMX 51 and COMX 52 modules offer an 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.

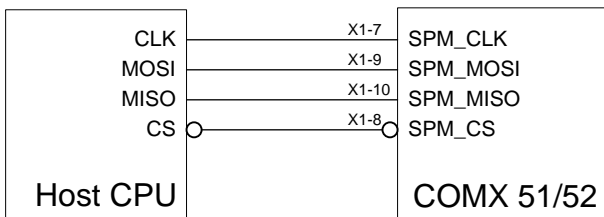


Figure 24: Serial dual-port memory interface

Table 24 lists the pin assignment of the serial dual-port memory interface at the system bus connector X1.

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 of the COMX 51 and COMX 52 modules, see the timing diagram in section *Serial Mode IO Timing* in [5], pages 265 - 266.

#### 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 25 shows the connections of the pins of X2 and the pins of the Fieldbus connector.

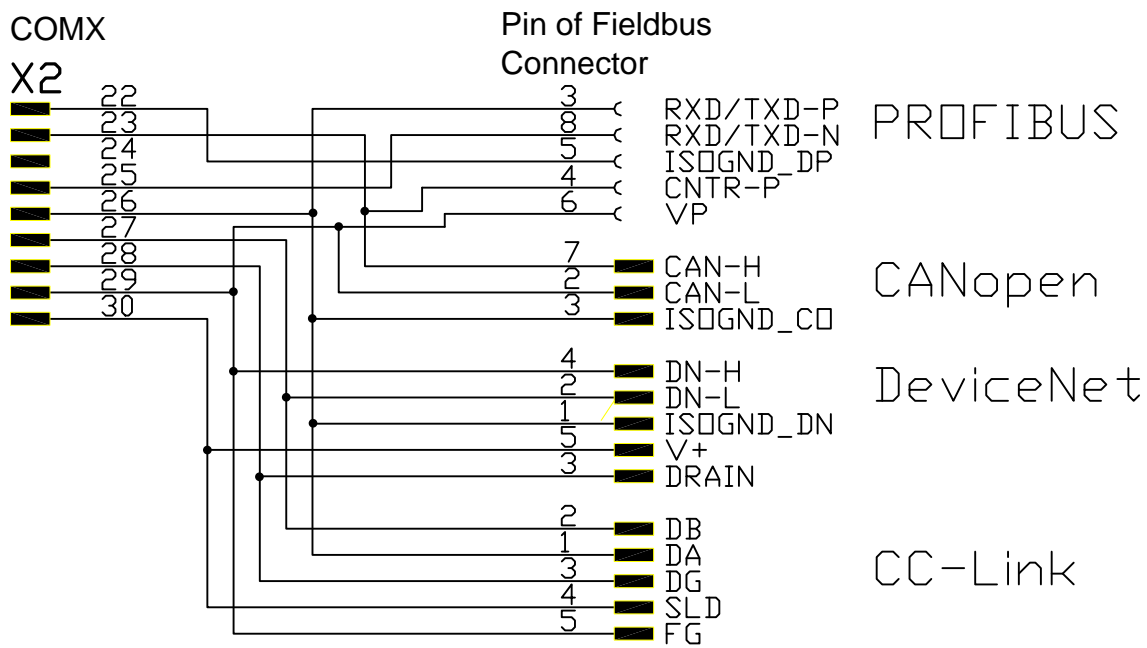


Figure 25: Fieldbus interface connections



### 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 2<sup>nd</sup> 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.

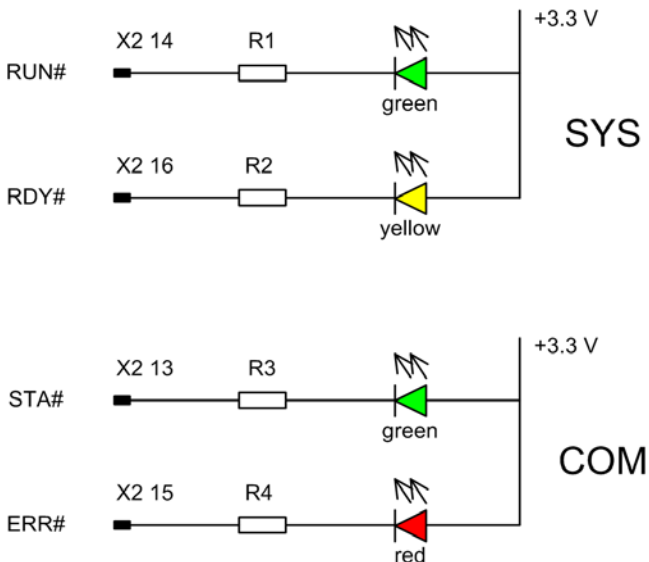


Figure 26: Example how to connect the LEDs COMX CN fieldbus

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

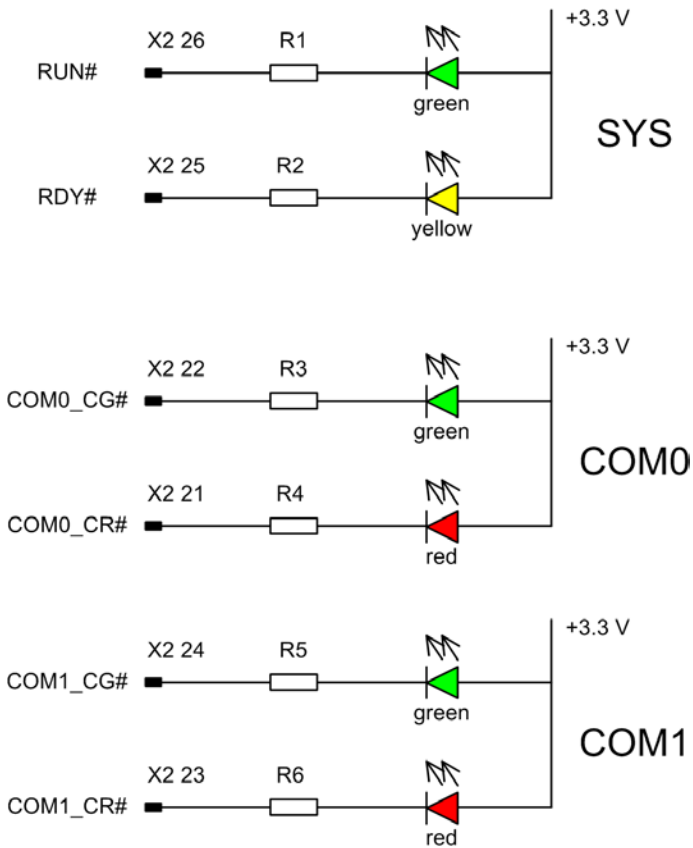


Figure 27: Example how to connect the LEDs COMX CN-RE

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 does not have integrated drivers.

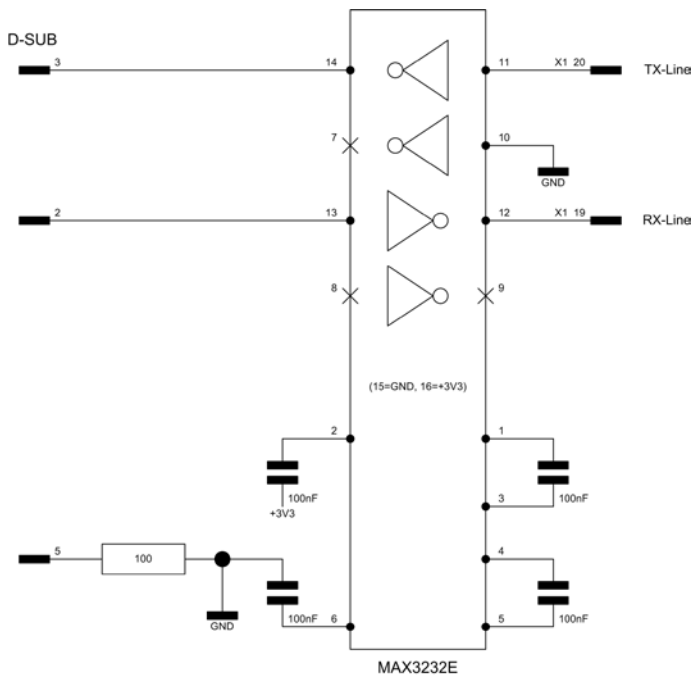


Figure 28: RS232C interface circuit for the diagnostic interface

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.

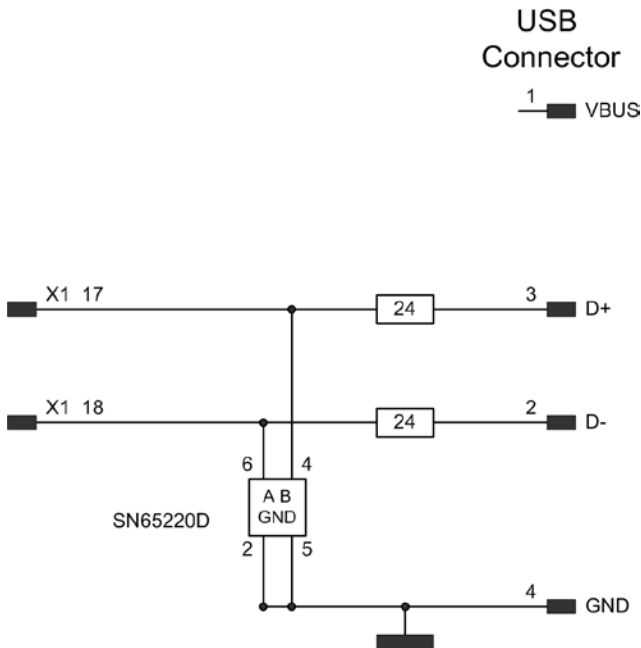


Figure 29: USB interface circuit for the diagnostic interface

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

| Module        | Hardware revision | Remark |
|---------------|-------------------|--------|
| COMX 51CA-RE  | 1                 | -      |
| COMX 51CN-RE  | 1                 | -      |
| COMX 52CA-CCS | 1                 | -      |
| COMX 52CA-COS | 1                 | -      |
| COMX 52CA-DNS | 1                 | -      |
| COMX 52CA-DPS | 1                 | -      |
| COMX 52CN-CCS | 1                 | -      |
| COMX 52CN-COS | 1                 | -      |
| COMX 52CN-DNS | 1                 | -      |
| COMX 52CN-DPS | 1                 | -      |
| 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 40: 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.

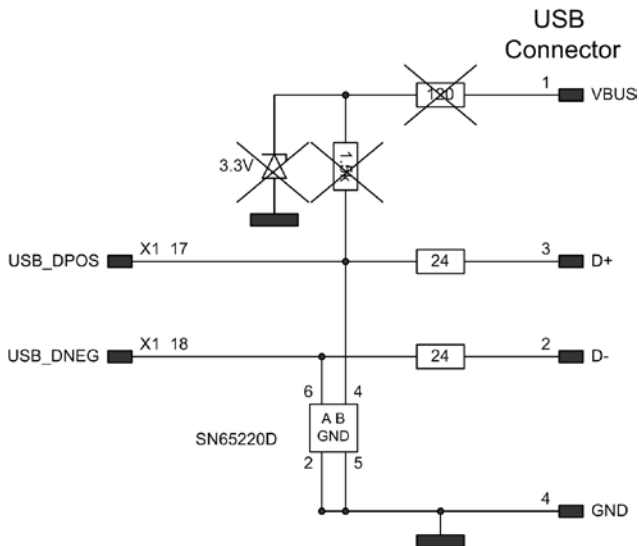
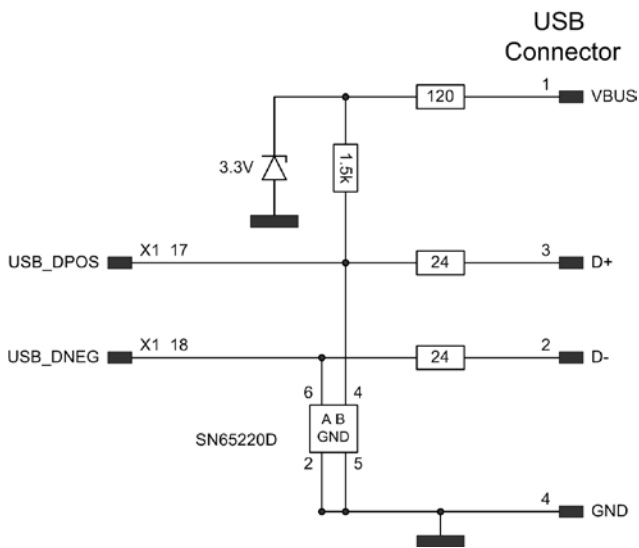


Figure 30: USB interface circuit modification for the diagnostic interface

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 100CA-RE | 6                 |
| COMX 100CN-RE | 1                 |

Table 41: Hardware revision of COMX modules with old USB interface

### 3.5 SYNC signals

COMX modules for Real-Time Ethernet provide SYNC signals. The SYNC Signal has LVTTTL level (3.3 V). A maximum load of 6 mA may not be exceeded. The SYNC signals can only be used if this is supported by the respective firmware, see table below.



#### 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 if the signal is 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 IO_SYNC0<br>Input/Output                             | Signal IO_SYNC1<br>Input/Output | From Firm-<br>ware Version | Remarks      |
|--------------------|---|---------------------------------|----------------------------|--------------|
| EtherCAT Slave     | SYNC 0<br>Output  | SYNC 1<br>Output                | -                          | Configurable |
| PROFINET IO Device | Bus cycle start (PROFINET IRT)<br>Output                    | -                               | 3.4.x.x                    | -            |
| sercos III Master  | External trigger to start bus cycle<br>Input<br>Rising edge | -                               | 2.0.8.0                    | -            |
| sercos III Slave   | CON_CLK<br>Output   | DIV_CLK<br>Output               | 3.0.10.0                   | Configurable |

Table 42: Meaning of the SYNC Signals for each Protocol

**Note:** A PROFINET IO certification for PROFINET IRT requires (mandatory) that the device offers the synchronization signal (SYNC0), in order to allow connecting an oscilloscope. The host system (your product) must provide the SYNC0 signal!

For this purpose, connect the SYNC0 signal and ground of the system connector of the comX with a well accessible 2-pin connector.

## 4 Technical data

| Operating condition                            |                |    | Minimum         | Maximum                                      |
|--|----------------|----|-----------------|--|
| Operating temperature [°C]<br>air flow 0.5 m/s | COMX 51CA-RE   |    | 0 °C            | +65 °C                                       |
|  | COMX 51CA-RE\R |    | -25 °C          | +70 °C                                       |
|  | COMX 51CN-RE   |    | -20 °C          | +70 °C                                       |
|  | COMX 52CA-CCS  |    | 0 °C            | +55 °C                                       |
|  | COMX 52CA-COS  |    | -20 °C          | +70 °C                                       |
|  | COMX 52CA-DPS  |    | -20 °C          | +70 °C                                       |
|  | COMX 52CA-DNS  |    | -20 °C          | +70 °C                                       |
|  | COMX 52CN-CCS  |    | 0 °C            | +55 °C                                       |
|  | COMX 52CN-COS  |    | -20 °C          | +70 °C                                       |
|  | COMX 52CN-DPS  |    | -20 °C          | +70 °C                                       |
|  | COMX 52CN-DNS  |    | -20 °C          | +70 °C                                       |
|  | COMX 100CA-CO  |    | -20 °C          | +65 °C                                       |
|  | COMX 100CN-CO  |    | -20 °C          | +65 °C                                       |
|  | COMX 100CA-DN  |    | -20 °C          | +65 °C                                       |
|  | COMX 100CN-DN  |    | -20 °C          | +65 °C                                       |
|  | COMX 100CA-DP  |    | -20 °C          | +65 °C                                       |
|  | COMX 100CN-DP  |    | -20 °C          | +70 °C (Revision 5)<br>+65 °C (Revision 1-4) |
|  | COMX 100CA-RE  |    | 0 °C            | +65 °C (Revision 8)<br>+60 °C (Revision 1-7) |
|  | COMX 100CN-RE  |    | -20 °C          | +70 °C                                       |
| Storage temperature [°C]                       |                |    | -10 °C          | +70 °C                                       |
| Operating voltage [V]                          |                | U1 | +3.3 V DC – 5 % | +3.3 V DC + 5 %                              |
|  |                |    | <b>Typical</b>  | <b>Maximum</b>                               |
| Operating current [mA], at +3.3 V DC           | COMX 51XX-RE   | U1 | 550 mA          | 580 mA                                       |
|  | COMX 51CA-RE\R | U1 | 470 mA          | 500 mA                                       |
|  | COMX 52CA-CCS  | U1 | 400 mA          | 410 mA                                       |
|  | COMX 52CA-COS  | U1 | 370 mA          | 400 mA                                       |
|  | COMX 52CA-DPS  | U1 | 400 mA          | 440 mA *                                     |
|  | COMX 52CA-DNS  | U1 | 400 mA          | 440 mA                                       |
|  | COMX 52CN-CCS  | U1 | 400 mA          | 410 mA                                       |
|  | COMX 52CN-COS  | U1 | 380 mA          | 400 mA                                       |
|  | COMX 52CN-DPS  | U1 | 400 mA          | 440 mA                                       |
|  | COMX 52CN-DNS  | U1 | 410 mA          | 430 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 43: Technical data – Operating conditions

\* Maximum current for normal operation



| EMC      |  |  | Generic standard                              | Basic standard  |
|----------|--|--|---|---|
| Immunity |  |  | EN 61000-6-2 (1999)<br>Industrial Environment | DIN EN 61000-4-2:2009-12<br>EN 61000-4-3<br>DIN EN 61000-4-4:2013-04<br>DIN EN 61000-4-5:2019-03<br>EN 61000-4-6<br>Details are listed in chapter 4.1 |
| Emission |  |  | EN 61000-6-4                                  | EN55011   |

Table 44: Technical data - EMC

| Mechanical dimensions |  |  | Minimum           | Maximum                                    |
|-----------------------|--|--|-------------------|--|
| Dimensions            |  |  |                   |  |
| COMX                  |  |  | 30 x 70 x 21.5 mm | 40 x 70 x 21.5 mm<br>for further extension |
| Weight                |  |  | 35 g              | 40 g                                       |

Table 45: Technical Data – Mechanical dimensions

## 4.1 Product tests

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

### 4.1.1 COMX 51CA-RE

| Immunity COMX 51CA-RE                                     |                          |                                |                        |             |
|---|--------------------------|--------------------------------|------------------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level             | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |                        |             |
|   |                          | Air discharge                  | ± 8 kV                 | A           |
|   |                          | Contact discharge              | ± 6 kV                 | B           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |                        |             |
|   |                          | Communication lines (shielded) | ± 2.2 kV<br>fr = 5 kHz | B           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |                        |             |
|   |                          | Communication lines (shielded) | 1 kV                   | A           |

Table 46: Product tests COMX 51CA-RE – Immunity

### 4.1.2 COMX 51CA-REIR

| Immunity COMX 51CA-RE                                     |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | ± 2 kV     | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 47: Product tests COMX 51CA-REIR – Immunity

### 4.1.3 COMX 51CN-RE

| Immunity COMX 51CN-RE                                     |                          |                                |                        |             |
|---|--------------------------|--------------------------------|------------------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level             | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |                        |             |
|   |                          | Air discharge                  | ± 8 kV                 | A           |
|   |                          | Contact discharge              | ± 6 kV                 | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |                        |             |
|   |                          | Communication lines (shielded) | ± 2.2 kV<br>fr = 5 kHz | B           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |                        |             |
|   |                          | Communication lines (shielded) | 1 kV                   | A           |

Table 48: Product tests COMX 51CN-RE – Immunity

### 4.1.4 COMX 52CA-CCS

| Immunity COMX 52CA-CCS                                    |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 49: Product tests COMX 52CA-CCS – Immunity

### 4.1.5 COMX 52CA-COS

| Immunity COMX 52CA-COS                                    |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Air discharge                  | ± 8 kV     | A           |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | ± 2 kV     | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 50: Product tests COMX 52CA-COS – Immunity

### 4.1.6 COMX 52CA-DPS

| Immunity COMX 52CA-DPS                                    |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Air discharge                  | ± 8 kV     | A           |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | ± 2.2 kV   | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 51: Product tests COMX 52CA-DPS – Immunity

### 4.1.7 COMX 52CA-DNS

| Immunity COMX 52CA-DNS                                    |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | ± 2.2 kV   | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 52: Product tests COMX 52CA-DNS – Immunity

### 4.1.8 COMX 52CN-CCS

| Immunity COMX 52CN-CCS                                    |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | ± 2 kV     | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge Tbd.                     |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 53: Product tests COMX 52CN-CCS – Immunity

### 4.1.9 COMX 52CN-COS

| Immunity COMX 52CN-COS                                    |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | ± 2 kV     | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 54: Product tests COMX 52CN-COS – Immunity

### 4.1.10 COMX 52CN-DPS

| Immunity COMX 52CN-DPS                                    |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | ± 2.kV     | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 55: Product tests COMX 52CN-DPS – Immunity

### 4.1.11 COMX 52CN-DNS

| Immunity COMX 52CN-DNS                                    |                          |                                |            |             |
|---|--------------------------|--------------------------------|------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |            |             |
|   |                          | Air discharge                  | ± 8 kV     | B           |
|   |                          | Contact discharge              | ± 6 kV     | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |            |             |
|   |                          | Communication lines (shielded) | ± 2 kV     | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |            |             |
|   |                          | Communication lines (shielded) | 1 kV       | A           |

Table 56: Product tests COMX 52CN-DNS – Immunity

### 4.1.12 COMX 100CA-CO

| Immunity COMX 100CA-CO                                    |                          |                                |                       |             |
|---|--------------------------|--------------------------------|-----------------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level            | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |                       |             |
|   |                          | Air discharge                  | ± 10 kV               | A           |
|   |                          | Contact discharge              | ± 6 kV                | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |                       |             |
|   |                          | Communication lines (shielded) | ± 2 kV<br>fr = 5 kHz  | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |                       |             |
|   |                          | Communication lines (shielded) | 1 kV<br>2 Ohm / 18 µF | A           |

Table 57: Product tests COMX 100CA-CO – Immunity

### 4.1.13 COMX 100CA-DN

| Immunity COMX 100CA-DN                                    |                          |  |                       |             |
|---|--------------------------|--|-----------------------|-------------|
| Generic Standard  | Basic Standard           | Test   | Test level            | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge  |                       |             |
|   |                          | Air discharge  | ± 8 kV                | B           |
|   |                          | Contact discharge  | ± 4 kV                | B           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst  |                       |             |
|   |                          | Communication lines (shielded)                                 | ± 2 kV<br>fr = 5 kHz  | B           |
|   |                          | DeviceNet 24 V power supply (unshielded)                       | ± 2 kV<br>fr = 5 kHz  | B           |
|   | DIN EN 61000-4-5:2019-03 | Surge  |                       |             |
|   |                          | Communication lines (shielded)                                 | 1 kV<br>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 58: Product tests COMX 100CA-DN – Immunity

### 4.1.14 COMX 100CA-DP

| Immunity COMX 100CA-DP                                    |                          |                                |                       |             |
|---|--------------------------|--------------------------------|-----------------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level            | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |                       |             |
|   |                          | Air discharge                  | ± 10 kV               | A           |
|   |                          | Contact discharge              | ± 6 kV                | A           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |                       |             |
|   |                          | Communication lines (shielded) | ± 2 kV<br>fr = 5 kHz  | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |                       |             |
|   |                          | Communication lines (shielded) | 1 kV<br>2 Ohm / 18 µF | A           |

Table 59: Product tests COMX 100CA-DP – Immunity

### 4.1.15 COMX 100CA-RE

| Immunity COMX 100CA-RE Rev.8                              |                          |                                |                      |             |
|---|--------------------------|--------------------------------|----------------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level           | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |                      |             |
|   |                          | Contact discharge              | ± 6 kV               | B           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |                      |             |
|   |                          | Communication lines (shielded) | ± 2 kV<br>fr = 5 kHz | B           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |                      |             |
|   |                          | Communication lines (shielded) | 1 kV                 | A           |

Table 60: Product tests COMX 100CA-RE Rev.8 – Immunity

### 4.1.16 COMX 100CN-CO

| Immunity COMX 100CN-CO                                    |                          |                                |                       |             |
|---|--------------------------|--------------------------------|-----------------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level            | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |                       |             |
|   |                          | Air discharge                  | ± 10 kV               | B           |
|   |                          | Contact discharge              | ± 6 kV                | B           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |                       |             |
|   |                          | Communication lines            | ± 2 kV<br>fr = 5 kHz  | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |                       |             |
|   |                          | Communication lines (shielded) | 1 kV<br>2 Ohm / 18 µF | A           |

Table 61: Product tests COMX 100CN-CO – Immunity

### 4.1.17 COMX 100CN-DN

| Immunity COMX 100CN-DN                                    |                          |  |                       |             |
|---|--------------------------|--|-----------------------|-------------|
| Generic Standard  | Basic Standard           | Test   | Test level            | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge  |                       |             |
|   |                          | Air discharge  | ± 10 kV               | B           |
|   |                          | Contact discharge  | ± 6 kV                | B           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst  |                       |             |
|   |                          | Communication lines (shielded)                                 | ± 2 kV<br>fr = 5 kHz  | B           |
|   |                          | DeviceNet 24 V power supply (unshielded)                       | ± 2 kV<br>fr = 5 kHz  | B           |
|   | DIN EN 61000-4-5:2019-03 | Surge  |                       |             |
|   |                          | Communication lines (shielded)                                 | 1 kV<br>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 62: Product tests COMX 100CN-DN – Immunity

### 4.1.18 COMX 100CN-DP

| Immunity COMX 100CN-DP                                    |                          |                                |                       |             |
|---|--------------------------|--------------------------------|-----------------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level            | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |                       |             |
|   |                          | Air discharge                  | ± 10 kV               | B           |
|   |                          | Contact discharge              | ± 6 kV                | B           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |                       |             |
|   |                          | Communication lines (shielded) | ± 2 kV<br>fr = 5 kHz  | A           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |                       |             |
|   |                          | Communication lines (shielded) | 1 kV<br>2 Ohm / 18 µF | A           |

Table 63: Product tests COMX 100CN-DP – Immunity

### 4.1.19 COMX 100CN-RE

| Immunity COMX 100CN-RE                                    |                          |                                |                       |             |
|---|--------------------------|--------------------------------|-----------------------|-------------|
| Generic Standard  | Basic Standard           | Test                           | Test level            | Error Class |
| EN IEC 61000-6-2 (2019)<br>Industrial Environment         | DIN EN 61000-4-2:2009-12 | Electrostatic Discharge        |                       |             |
|   |                          | Air discharge                  | ± 8 kV                | A           |
|   |                          | Contact discharge              | ± 4 kV                | B           |
| EN 61131-2 (2008-04)+A11, A12<br>Programmable Controllers | DIN EN 61000-4-4:2013-04 | Burst                          |                       |             |
|   |                          | Communication lines (shielded) | ± 2 kV<br>fr = 5 kHz  | B           |
|   | DIN EN 61000-4-5:2019-03 | Surge                          |                       |             |
|   |                          | Communication lines (shielded) | 1 kV<br>2 Ohm / 18 µF | A           |

Table 64: Product tests COMX 100CN-RE – Immunity

# 5 Appendix

## 5.1 Legal notes

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## 5.3 List of tables

|   |    |
|---|----|
| Table 1: Basic differences between COM and COMX .....   | 5  |
| Table 2: Comparison of supported protocols for COM and COMX .....   | 5  |
| Table 3: List of revisions .....  | 6  |
| Table 4: comX modules – Old and new names.....  | 9  |
| Table 5: References to documents .....  | 10 |
| Table 6: Available comX modules .....   | 11 |
| Table 7: Minimum required space on top of top side of the printed circuit board .....                         | 13 |
| Table 8: Mechanical dimensions (Drawings overview).....   | 14 |
| Table 9: Connector types .....  | 22 |
| Table 10: Usage of bolt for COMX modules.....   | 26 |
| Table 11: Drawings of bolts (Overview) .....  | 26 |
| Table 12: Drawings of assembled bolt (Overview).....  | 26 |
| Table 13: Meaning of the address switch of COMX 52CA-DPS and COMX 52CN-DPS .....                              | 31 |
| Table 14: Meaning of the address switch of COMX 52CA-COS and COMX 52CN-COS.....                               | 32 |
| Table 15: Meaning of the address switch of COMX 52CA-DNS and COMX 52CN-DNS .....                              | 32 |
| Table 16: Meaning of the address and baud rate switch of COMX 52CA-CCS and COMX 52CN-CCS .....                | 33 |
| Table 17: Value range for station address depending on number of stations .....                               | 33 |
| Table 18: Meaning of the address switch of COMX 51CA-RE\R.....  | 34 |
| Table 19: Dual-port memory size and supported modes of the comX modules .....                                 | 35 |
| Table 20: Possibilities for usage of dual-port memory.....  | 35 |
| Table 21: COMX pin assignment of the system bus connector X1- Parallel DPM mode (Part 1).....                 | 37 |
| Table 22: COMX pin assignment of the system bus connector X1 – Parallel DPM mode (Part 2).....                | 38 |
| Table 23: Notes for COMX pin assignment of the System Bus Connector X1 .....                                  | 38 |
| Table 24: COMX pin assignment of the system bus connector X1- Serial DPM mode COMX 51/COMX 52 (Part 1) .....  | 39 |
| Table 25: COMX pin assignment of the system bus connector X1 – Serial DPM Mode COMX 51/COMX 52 (Part 2) ..... | 40 |
| Table 26: Notes for COMX pin assignment of the system bus connector X1 .....                                  | 40 |
| Table 27: PAD type explanation.....   | 41 |
| Table 28: Fieldbus connector X2 for CC-Link Slave.....  | 43 |
| Table 29: Notes for fieldbus connector X2 for CC-Link Slave .....   | 43 |
| Table 30: Fieldbus connector X2 for CANopen-Master/-Slave.....  | 44 |
| Table 31: Notes for fieldbus connector X2 for CANopen-Master/-Slave .....                                     | 44 |
| Table 32: Fieldbus connector X2 for DeviceNet-Master/-Slave.....  | 45 |
| Table 33: Notes for fieldbus connector X2 for DeviceNet-Master/-Slave .....                                   | 45 |
| Table 34: Fieldbus connector X2 for PROFIBUS-Master/-Slave .....  | 46 |
| Table 35: Notes for fieldbus connector X2 for PROFIBUS-Master/-Slave.....                                     | 46 |
| Table 36: Fieldbus connector X2 for Real-Time Ethernet .....  | 47 |
| Table 37: Function table of the 16 bit decode logic.....  | 50 |
| Table 38: Symbols for COMX timing diagram for read and write access .....                                     | 53 |
| Table 39: Function table of decode logic.....   | 54 |
| Table 40: Hardware revision of COMX modules with new USB interface .....                                      | 60 |
| Table 41: Hardware revision of COMX modules with old USB interface .....                                      | 62 |
| Table 42: Meaning of the SYNC Signals for each Protocol.....  | 63 |
| Table 43: Technical data – Operating conditions .....   | 64 |
| Table 44: Technical data - EMC.....   | 65 |
| Table 45: Technical Data – Mechanical dimensions .....  | 65 |
| Table 46: Product tests COMX 51CA-RE – Immunity .....   | 66 |
| Table 47: Product tests COMX 51CA-RE\R – Immunity .....   | 66 |
| Table 48: Product tests COMX 51CN-RE – Immunity.....  | 66 |
| Table 49: Product tests COMX 52CA-CCS – Immunity .....  | 67 |
| Table 50: Product tests COMX 52CA-COS – Immunity .....  | 67 |
| Table 51: Product tests COMX 52CA-DPS – Immunity.....   | 67 |
| Table 52: Product tests COMX 52CA-DNS – Immunity .....  | 67 |
| Table 53: Product tests COMX 52CN-CCS – Immunity .....  | 68 |
| Table 54: Product tests COMX 52CN-COS – Immunity .....  | 68 |
| Table 55: Product tests COMX 52CN-DPS – Immunity .....  | 68 |
| Table 56: Product tests COMX 52CN-DNS – Immunity .....  | 69 |
| Table 57: Product tests COMX 100CA-CO – Immunity.....   | 69 |
| Table 58: Product tests COMX 100CA-DN – Immunity.....   | 69 |
| Table 59: Product tests COMX 100CA-DP – Immunity .....  | 70 |
| Table 60: Product tests COMX 100CA-RE Rev.8 – Immunity.....   | 70 |
| Table 61: Product tests COMX 100CN-CO – Immunity .....  | 70 |
| Table 62: Product tests COMX 100CN-DN – Immunity.....   | 71 |
| Table 63: Product tests COMX 100CN-DP – Immunity.....   | 71 |
| Table 64: Product tests COMX 100CN-RE – Immunity.....   | 71 |

## 5.4 List of figures

|   |           |
|---|-----------|
| Figure 1: Block diagram of the COMX modules .....   | 8         |
| Figure 2: COMX CA type - Connector X1.....  | 12        |
| Figure 3: COMX CN type - Connectors X1 and X2 .....   | 12        |
| Figure 4: General Mechanical dimension of COMX-CA-XXX.....  | 15        |
| Figure 5: Mechanical dimension of COMX-CN-XXX .....   | 16        |
| Figure 6: Mechanical dimension of light pipe of COMX 51/52/100CA-XXX.....                                 | 17        |
| <i>Figure 7: Mechanical dimension of cover and connector of COMX 51/100CA-RE and COMX 51CA-REIR .....</i> | <i>18</i> |
| <i>Figure 8: Mechanical dimension of cover and connector of COMX 51CA-REIR.....</i>                       | <i>19</i> |
| Figure 9: Mechanical dimension of cover and connector of COMX 52CA-XXX (Fieldbus) .....                   | 20        |
| Figure 10: Mechanical dimension of cover and connector of COMX 100CA-XXX (Fieldbus) .....                 | 21        |
| Figure 11: TFM connector .....  | 23        |
| Figure 12: How to layout the signals at the connectors X1 and X2 .....                                    | 25        |
| Figure 13: Mechanical dimension of Bolt COM-CA-B20X5 .....  | 27        |
| Figure 14: Mechanical dimension of Bolt COM-CA-B31,5X5 .....  | 28        |
| Figure 15: Mechanical dimension of Bolt COM-CA-B24X5 .....  | 29        |
| Figure 16: Mechanical dimension how to assemble COM-CA-XXX on the motherboard .....                       | 30        |
| Figure 17: Example matrix code label of COMX modules .....  | 31        |
| Figure 18: Schematic view of netX pad types .....   | 42        |
| Figure 19: Ethernet connection COMX-CN-RE .....   | 48        |
| Figure 20: Ethernet connector example (ERNI 203313) .....   | 48        |
| Figure 21: COMX timing diagram for read access .....  | 52        |
| Figure 22: COMX timing diagram for write access .....   | 52        |
| Figure 23: Interface with 8-bit data bus - Interface with 16-bit interface .....                          | 54        |
| Figure 24: Serial dual-port memory interface .....  | 55        |
| Figure 25: Fieldbus interface connections.....  | 56        |
| Figure 26: Example how to connect the LEDs COMX CN fieldbus .....   | 57        |
| Figure 27: Example how to connect the LEDs COMX CN-RE .....   | 58        |
| Figure 28: RS232C interface circuit for the diagnostic interface.....                                     | 59        |
| Figure 29: USB interface circuit for the diagnostic interface.....  | 60        |
| Figure 30: USB interface circuit modification for the diagnostic interface.....                           | 61        |

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