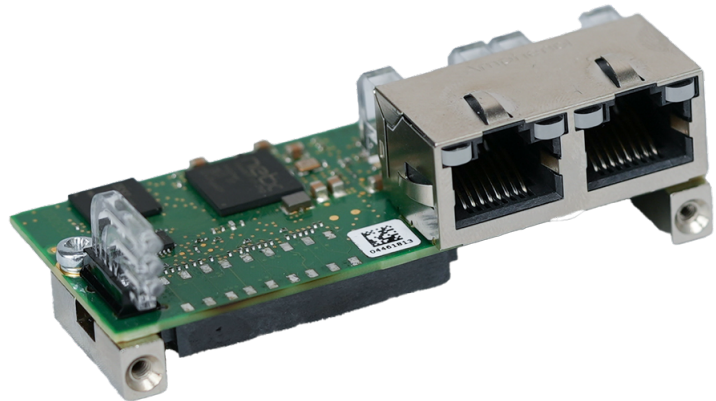


Design guide
COMX 90



Hilscher Gesellschaft für Systemautomation mbH
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1 Introduction

1.1 About this document

This document is directed to hardware developers who intend to create a hardware design to integrate a communication module of the type COMX 90.

1.2 List of revisions

Rev	Date	Section	Revision
1	2025-07-09	All	Created.

Table 1: List of revisions

2 Design-in - Mechanical aspects

Size

The communication module has a board size of 30 mm x 70 mm.

Top view

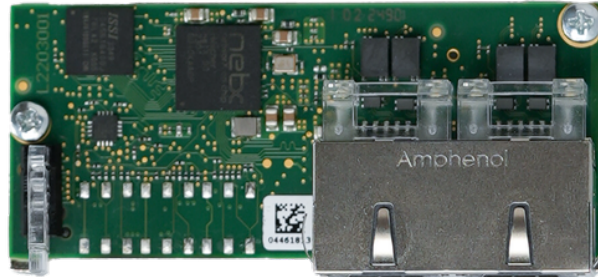


Figure 1: COMX 90CA-RE (Top view)

Bottom view

The following figure shows the position of connector X1.

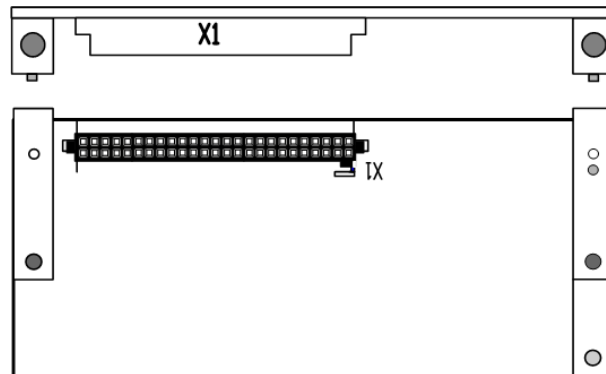


Figure 2: COMX 90 CA Type (Bottom view, position of X1)

Host system

The following figure shows the dimensions for the communication module on the host system.

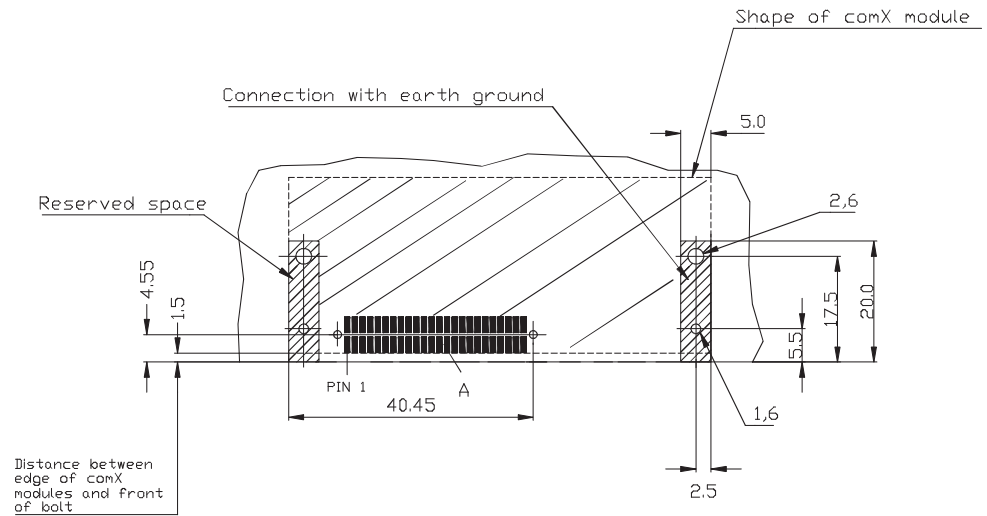


Figure 5: Dimension on the host system for the communication module

Footprint on the host system

The following figure shows the dimensions for the footprint on the host system.

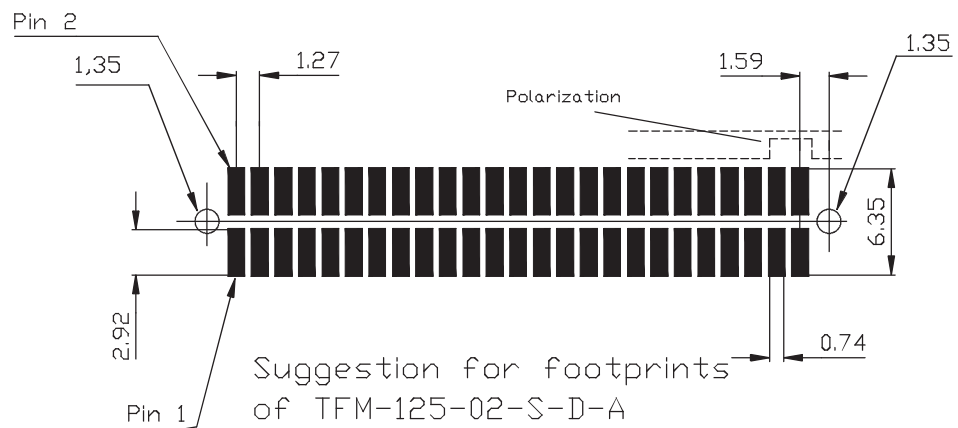


Figure 6: Footprint dimensions on the host system

Cover

The following figure shows the dimensions for the cover of the host system.

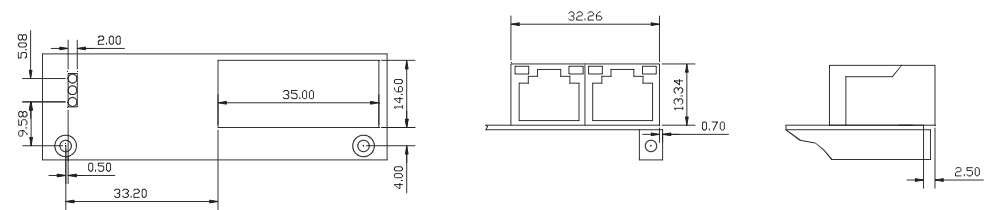


Figure 7: Dimensions for the cover

2.2 Connector to host system

The connector X1 on the COMX module to connect the host interface is a 50 pins SMT socket type with a grid of 1.27 mm.

The connector on the host system is the corresponding plug type and can be ordered as follows:

SAMTEC (www.samtec.com)

Connector	Standard	Cheaper version
50-pin connector	TFM - 125 - 02 - S - D - A	TFC - 125 - 02 - F - D - A

Table 2: Connector X1 (host system)

Please note that the polarization of X1 is opposite to pin 1!

Storage and contact reliability of host-side connector

For connectors X1 used in the COMX communication modules (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.

2.3 Mounting of COMX communication modules

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

The metal block close to the Ethernet connector must be connected to FE (Function Earth).

The metal block close to the LEDs is not connected to the COMX circuit and can be connected to FE, too.

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

On the front side of the metal blocks 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.

The following figure shows dimensions for the layout.

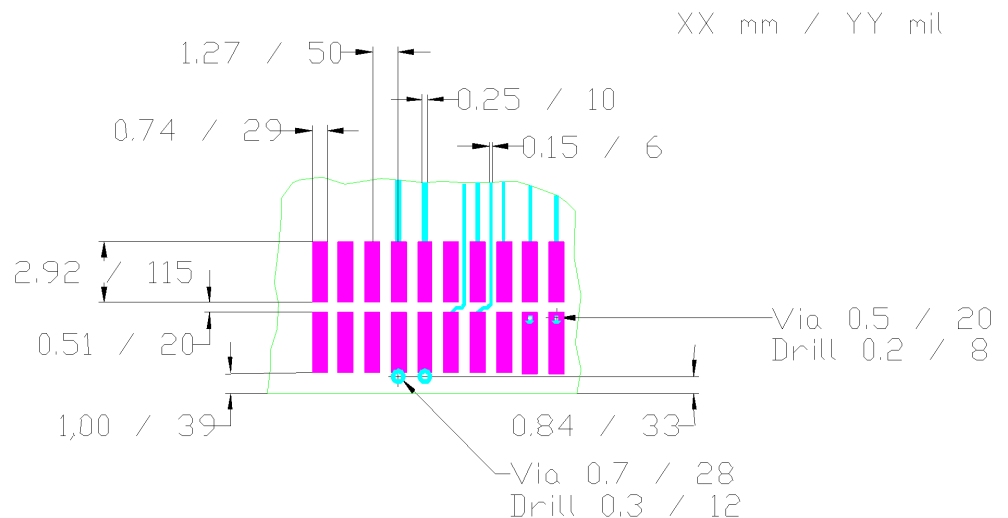


Figure 8: Dimensions for the layout

Metal bolts

COMX	Type	Left side	Right side
COMX 90CA	RE	COM-CA-B20X5	COM-CA-B31.5X5

Table 3: Metal bolt on COMX 90 communication modules

The following figure shows the dimensions of metal bolt COM-CA-B20X5.

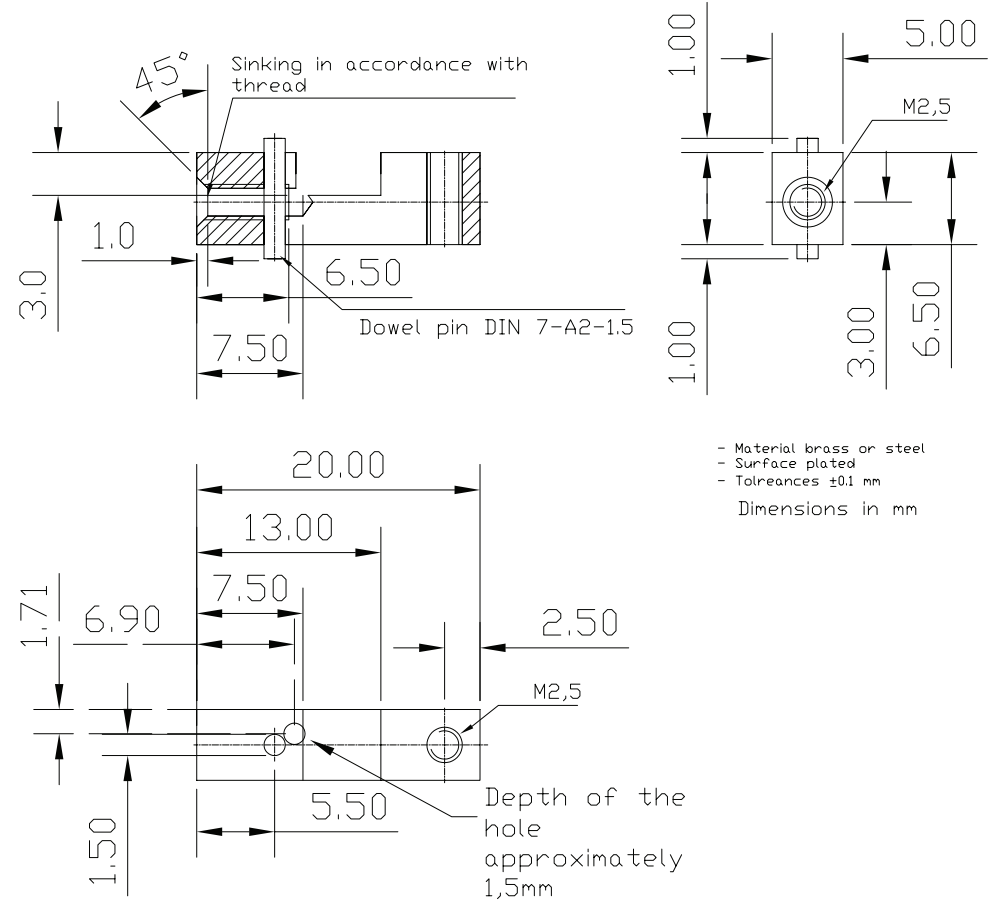


Figure 9: Metal bolt COM-CA-B20X5

The following figure shows the dimensions of metal bolt COM-CA-B31.5X5.

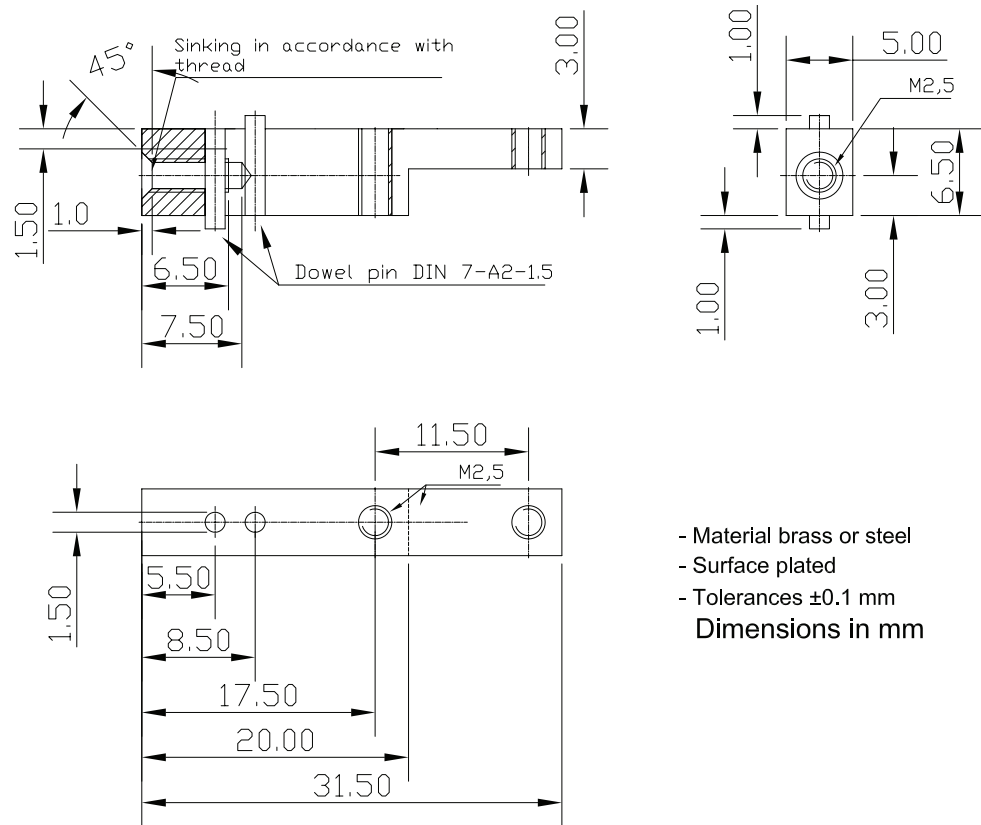


Figure 10: Metal bolt COM-CA-B31.5X5

2.4 Material recommended for the housing

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

2.5 LEDs on cover

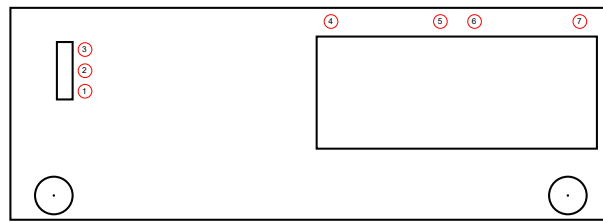


Figure 11: COMX 90 (LEDs on cover)

LED on position (1) is the SYS LED. The color of the SYS LED is yellow/green.

General names	COM0	COM1	ACT (CH0)	LINK (CH0)	ACT (CH1)	LINK (CH1)
Color	red/green	red/green	yellow	green	yellow	green
Protocol / position	(2)	(3)	(4)	(5)	(6)	(7)
PROFINET IO	SF	BF	RX/TX	LINK	RX/TX	LINK
EtherNet/IP	MS	NS	ACT	LINK	ACT	LINK
EtherCAT Slave	RUN	ERR	-	L/A IN	-	L/A OUT
POWERLINK Controlled Node	BS	BE	-	L/A	-	L/A
Open Modbus/TCP	RUN	ERR	ACT	LINK	ACT	LINK
Sercos III Slave	S	-	-	L/A	-	L/A
CC-Link IE Field Basic Slave	RUN	ERR	-	L/A	-	L/A

Table 4: LED names

3 Design-in - Electrical aspects

The communication module requires a power supply of +3.3 V DC. The voltage levels of the signals have to be not higher than 3.3 V.

The interface to the host is a serial dual-port memory (SPM).

3.1 System interface (X1)

X1 is the system interface with the following signals:

- Power supply for the communication module
- Serial host interface
- Diagnostic interface: UART
- Reset signal
- Synchronization signals

3.1.1 Pin assignment (Host interface and UART)

Signal	Symbol	Dir	Pin	X1	Pin	Dir	Symbol	Signal
-	Reserved	-	1		2	-	Reserved	-
-	Reserved	-	3		4	-	Reserved	-
Serial port memory: Optional SIRQ for host (e.g. for service IRQ)	SPM_SIRQn	out	5		6	out	SPM_DIRQn	Serial port memory: Optional DIRQ for host (e.g. for data IRQ)
Serial port memory: Serial clock input	SPM_CLK	in	7		8	in	SPM_CNn	Serial port memory: Chip-select input
Serial port memory: Master out slave in data input	SPM_MOSI	in	9		10	out	SPM_MISO	Serial port memory: Master in slave out data output
Ground	GND	GND	11		12	in	3V3	Power supply: +3.3 V
-	Reserved	-	13		14	-	Reserved	Reserved
Synchronization signal 0	SYNC0	out	15		16	out	SYNC1	Synchronization signal 1
-	Reserved	-	17		18	-	Reserved	Reserved
UART Receive	UART0_RXD	in	19		20	out	UART0_TXD	UART Transmit
Reset, active low (RST_IN_N)	DPM_RESETh	in	21		22	-	Reserved	-
-	Reserved	-	23		24	-	Reserved	-
-	Reserved	-	25		26	-	Reserved	-
-	Reserved	-	27		28	-	Reserved	-
-	Reserved	-	29		30	-	Reserved	-
-	Reserved	-	31		32	-	Reserved	-
-	Reserved	-	33		34	-	Reserved	-
-	Reserved	-	35		36	-	Reserved	-
-	Reserved	-	37		38	-	Reserved	-
-	Reserved	-	39		40	-	Reserved	-
-	Reserved	-	41		42	-	Reserved	-
-	Reserved	-	43		44	-	Reserved	-
-	Reserved	-	45		46	-	Reserved	-
-	Reserved	-	47		48	-	Reserved	-
Ground	GND	GND	49		50	in	3V3	Power supply: +3.3 V

Table 5: Pin assignment (Host interface and UART)



Note:

Pins marked „reserved“: Leave reserved pins unconnected. Do not connect Ground. Do not connect 3V3.

3.2 Power supply

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 V ... 3.465 V) and must be connected to both 3V3 pins (pin 12 and pin 50) of the system bus connector X1. To avoid EMI problems we suggest using bypass capacitors in the power supply path.

3.3 Reset signal

It is possible to reset the COMX module using the reset signal DPM_RESETh. For operation of the COMX module it is important to switch the signal DPM_RESETh to high level. Then the COMX module begins with the program execution and initialization. The COMX module is in reset state when the signal DPM_RESETh has a static low level. To reset the COMX module the DPM_RESETh signal must be low for more than 10 μ s.

3.4 Serial dual-port memory (SPM)

The COMX module offers an SPI Slave interface which is used for serial access to the dual-port memory of the COMX.

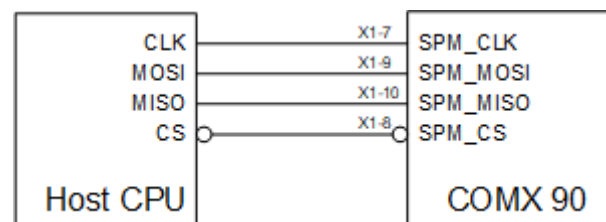


Figure 12: Serial dual-port memory interface

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

Timing diagram serial dual-port memory interface

To access the dual-port memory of the COMX 90 communication modules, see the timing diagram in section “Serial Mode IO Timing” in netX 90 technical reference guide.

Software implementation and protocol

For information about the software implementation and the protocol see section Host Software Implementation and section Serial DPM Protocol Description.

3.5 UART interface

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

Over this diagnostic interface 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 system. The module does not have integrated drivers.

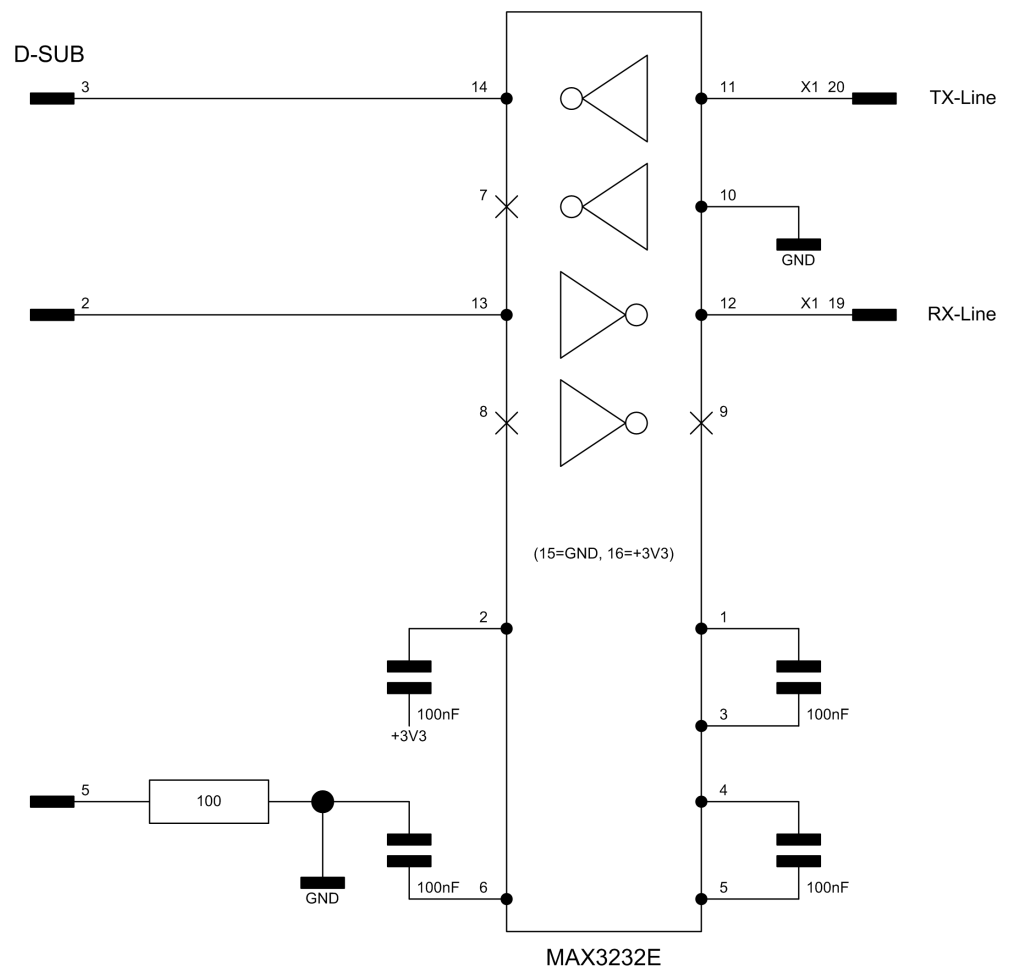


Figure 13: RS232C interface

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

3.6 Sync signals

COMX communication modules for Real-Time Ethernet provide sync signals. The sync signal has LVTTTL level (3.3 V). A maximum current 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.

Protocol	SYNC0	SYNC1	Remark
PROFINET IO	Bus cycle start output	-	-
EtherCAT Slave	Sync 0 output	Sync 1 output	Configurable
Sercos III Slave	CON_CLK output	DIV_CLK output	Configurable

Table 6: Sync signal (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 communication module with a well accessible 2-pin connector.

4 Technical data

4.1 COMX 90CA-RE

COMX 90CA-RE	Parameter	Value
Product	Part number	1591.100
	Brief description	Communication Module Real-Time Ethernet
Communication controller	netX	netX 90
Integrated Memory	RAM	8 MByte
	FLASH	8 MByte serial Flash
Power supply	Supply voltage	+3.3 V DC \pm 5 %
	Typical/maximum current	201 mA (at 3.3 V) / 206 mA (at 3.0 V)
	Typical power consumption	680 mW
	Power connector	Via system bus connector X1
System interface	Type	Serial dual-port memory interface
	Connector	50-pin SMT connector, socket
	Pin distance	1.27 mm
	Dual-port memory size	32 KByte
	Serial dual-port memory interface	SPI Slave, mode 3
	Baud rate	max. 50 MHz
Communication interface	Communication standard	Ethernet
	Interface type	10BASE-T/100BASE-TX, potential-free
	Auto negotiation	supported
	Auto cross over	supported
	Connector	2 * RJ45 socket
Diagnostic interface	Type	UART
	Connector	Signal at host interface. Available only if integrated in host system.
Display	LED display	SYS System Status, green: RUN, yellow: RDY
		COM0, COM1 Communication status, both green/red
		ACT0, ACT1, Ethernet activity status, yellow
		LINK0, LINK1, Ethernet link status, green
Environment	Ambient temperature range for operation	-20 °C ... +75 °C (Air flow during measurement: 0,5 m/s)
	Ambient temperature range for storage	-40 °C ... +85 °C
	Humidity range	10 % ... 95 % relative humidity (non-condensing)
	Altitude	0 m ... 2000 m
Device	Dimensions (L x W x H)	70.1 mm x 32.6 mm x 21.2 mm
	Weight	31 g
	Mounting	using screwable metal bolts, according to comX Design Guide

COMX 90CA-RE	Parameter	Value
Configuration	Configuration software	Communication Studio
	API	By application
Conformity	RoHS	yes
Conformance with EMC directives	CE sign	yes
	UKCA sign	yes
	Emission	EN 61000-6-4 / BS EN 61000-6-4
	Immunity	EN 61000-6-2 / BS EN 61000-6-2

Table 7: Technical data COMX 90CA-RE

5 Appendix

5.1 Legal notes

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